



FRIDAY, AUGUST 11, 1893.

CONTENTS.

ILLUSTRATIONS:	PAGE.	GENERAL NEWS:	PAGE.
Compound Locomotive for Lake Street Elevated Railroad, Chicago	600	Elections and Appointments	613
New York Central Draw-bridge at Harlem River, New York	602	Railroad Construction	613
Allen Hotel Car	604	General Railroad News	614
Lunkin Gate Valve	605	Traffic	614
CONTRIBUTIONS:		MISCELLANEOUS:	
Roberts' Deflector Plates	599	Technical	610
EDITORIALS:		The Scrap Heap	611
Block System on Railroads of Light Traffic	606	The International Engineering Congress	599
Complaining Shippers and Their Treatment in England	607	Annual Address of the President of the American Society of Civil Engineers	600
The Shrinkage of Railroad Business	607	Proposed Method of Testing Structural Steel	601
EDITORIAL NOTES	606, 608	Surveys for Railroad Location	604
Trade Catalogues	608	City & South London Railway	605
GENERAL NEWS:		Chicago Traffic Matters	608
Car Building	611	Impressions of the World's Fair	609
Bridge Building	611	Engineering Congress Papers	609
Railroad Law	612	Foreign Railroad Notes	610
Meetings and Announcements	612		
Personal	612		

Contributions.

Roberts' Deflector Plates.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of July 23 you publish a description of the Roberts perforated deflector plates, with statements of the economies effected by the use of this device. If the cut, which is printed with the description, is a true representation of the position of the diaphragm plates in the engines experimented with, this would account for the saving in fuel reported, for the reason that there existed about as much obstruction to the draft as could be well arranged for, without actually stopping the draft altogether. The diaphragm is too close to the flue sheet, especially at the bottom; the gases from the flues have to be turned at right angles and after ward drawn through a small opening under the diaphragm, which opening is almost entirely covered and obstructed by the lower ends of the steam and exhaust pipes. To get any kind of a draft with such a position of diaphragm, the exhaust would have to be very sharp. The true remedy would be to alter the position of the diaphragm by inclining it well forward, giving the gases an easier run, and, if necessary, placing the diaphragm entirely in front of the steam pipes; such changes have been made with many engines having similarly badly placed diaphragms, giving excellent results, throwing the sinders well to the front, giving a softer draft on the fire, with plenty of steam, while using a larger nozzle than before. It seems poor policy to lock the draft in by an iron door, and then because it is wasteful to have to pull the draft through the cracks, punch the door full of holes to obtain relief. Why not open the door half way, or, at least, stand it ajar.

EXTENSION FRONT.

The International Engineering Congress.

DIVISION A—CIVIL ENGINEERING.

Wednesday morning a group of four papers on steel was read. These were Treatment of Metal for Structural Purposes, by James Christie, M. Am. Soc. C. E., The Use of Basic Mild Steel as Material for Construction in Germany, by C. Weyrich, Hamburg; A Proposed Method of Testing Structural Steel, by A. E. Hunt, M. Am. Soc. C. E., and The Use of Mild Steel for Engineering Structures, by George C. Mehrtens, Bromberg, Prussia. Brief abstracts of these papers will be published in the *Railroad Gazette*, some of them in this issue.

The papers were discussed at considerable length.

Mr. GEORGE S. MORISON was much interested in the method of testing proposed by Mr. Hunt. Equipping the punches in a shop so that every rivet hole could be tested would be ideal; if we knew that the metal was good in every punched hole we need not worry much about the rest of it; but he saw two objections to the method. First, no machines for carrying it out completely in shop work had been constructed. Second, plates should not be punched, but drilled. Nevertheless, the method is worth very careful consideration. Of course it would not be complete; in a pin-connected bridge, for instance, eye bars should be tested by pulling to destruction and the pins should be bored lengthwise through their middles. In a recent case the manufacturers of a set of bridge pins had voluntarily bored them all, taking a continuous core from the entire length of each pin. The metal thus taken out would give the best possible test piece, for it would certainly be the worst metal in the pin.

Mr. L. L. BUCK said that an inspector can get the most intimate acquaintance possible with material by watching it in all its processes in the mill and shop, and the equipment of the tools with recording apparatus as suggested by Mr. Hunt would give him the means of most complete knowledge of the material. But he doubted the possibility of getting the data for accurate comparisons, as the conditions to which each piece is subjected are almost certain to vary. There must be a

difference in the size, the shape and the condition of the tools. Sharp punches, for example, will give a different result from dull ones. A still more serious difference would be found in the clearance of the dies.

Mr. BUCK read also a brief discussion of Mr. Christie's paper, which he considered a very excellent document. He admitted that it was common to consider iron as fibrous and steel as crystalline, but, in fact, steel contains interior seams or cavities or laminations, which are sufficient to arrest the progress of a crack. A crack started in steel will go on until it comes to one of these interruptions of the homogeneity of the material. He considered it important in the construction of steel structures that rivet holes should be reamed, and all sharp edges left by drills or reamers should be removed by a slight countersink.

Mr. KENT asked what reason we have to think that the working strain in any given member is 10,000 lbs. per square inch or 17,000 lbs. He thinks that there is a great lack of definite knowledge as to the actual conditions of material under strain in structures. He said that there is a tendency now to the use of milder steels and asked the reason why.

Mr. D. J. WHITTEMORE spoke of the doubts among engineers of the entire reliability of steel as a material for bridge construction. He is doubtful if steel is proper for all bridge members. Engineers with whom he had talked lately are of the opinion that it may be well to make the eye-bars of steel and all the rest of the bridge of iron. He had known recently of two girders having been dropped between cars, owing to the cars pulling apart, and both girders were fractured and ruined.

Mr. GLEIM said that similar cases in Germany for a long time retarded the use of mild steel, but constructing engineers now consider that steel made and used according to modern methods is safe.

Mr. THOMSON suggested that it would be well to know what kind of steel it was that dropped and broke. He had had a recent experience with a girder 104 ft. long, one end of which fell 10 ft., distorting it somewhat, but not breaking the girder.

Mr. MORISON told of a steel draw-span at Jacksonville, Fla., which was hit by a schooner being towed through the draw. The schooner was pretty badly damaged by two or three bumps and finally the bowsprit, a stick of pine 26 in. square, was broken off by striking a post in the truss. The post was bent and so was the bottom cord and the bridge was closed by the force of the blow and so securely locked that it took eight hours to open it. The bridge, however, was not disabled or made unsafe.

Mr. BUCK told the story of a very old wooden arch-bridge at Schenectady, which was hit by a canal-boat and the canal-boat was demolished while the bridge was not injured, but he did not know that this incident proved anything as to the safety of mild steel for bridge-structures.

Mr. ROBERT MOORE in his recent experience in building an elevated railroad structure in St. Louis had used iron anchor bolts. All the rest of the structure was steel. These bolts were the only part of the structure that had failed, although one post had been hit by a derailed freight train with such force that the train was very badly wrecked. The post was bent, but continued to do its work perfectly, and was only taken out of the structure for the sake of appearance.

Mr. GRIFFITHS, M. Inst. C. E., said that steel has one serious drawback as a structural material, that is, the difficulty of welding it. When this is overcome, which he thinks will be done soon, that difficulty will disappear. He was much interested in Mr. Hunt's suggestion for testing steel, and mentioned a suggestion made 30 years ago in England to measure the work done in tensile tests of iron.

Mr. GLEIM said that the German specifications require lower tensile strength than those used in America, and reject material above a certain maximum strength. He called attention to an evident error in the conversion of kilogrammes into tons per square inch in the translation of Mr. Weyrich's paper.

Mr. HUNT, in reply to the point raised by Mr. Morison, said that the work done in drilling could be measured as well as the work of punching. He dissented from Mr. Christie's opinion that the effects of sulphur and phosphorus on steel are entirely evil. Pure iron is almost as weak as aluminum. It must have some hardness, and for structural steel it is well to use phosphorus, say 0.05.

Mr. METCALF closed the discussion with some valuable comments on the nature and treatment of mild steel. Much of the so-called mild steel of low tensile strength and great elongation is simply rotten steel. The carbon is blown or burnt out, and the oxygen and nitrogen degrade the metal and can never be got rid of. He uses boiler steel of 0.25 carbon, and considers it safer than steel of 0.05. If engineers would get rid of the notion of using very soft steel with great elongation, and blow or melt it to, say, not less than 0.15 carbon, and then recar-bonize up to 0.25, they would have little trouble. One of the serious difficulties with very mild steel is that the ingots are so liable to be soft and spongy.

THURSDAY.

The first paper presented at the session of Thursday morning was on the gauges of a railroad track in general, with special consideration of narrow gauge railroads, by E. A. Ziffer, C. E., Railroad Director, Vienna.

A short abstract of Mr. Ziffer's paper follows this article. It was presented by title only and was discussed by Mr. Foster Crowell and Mr. H. G. Prout. The sum of the discussion was that Mr. Ziffer's assumption, that the cost of construction and of maintenance and of operation of a railroad depends directly upon the gauge, is an error; that on the contrary a railroad of 4 ft. 8½ in. gauge may be built and equipped and maintained and operated even cheaper than one of 3 ft. gauge, to carry the same amount of traffic, and that the figures of operating expenses given by Mr. Ziffer are worthless, inasmuch as he gives no statement of the conditions under which the work was done or of the rates charged. Mr. Crowell had recently inspected a group of ten minor railroads, four of narrow gauge and six of standard gauge, with a view to determining their actual value, and found that the standard gauge railroads were the only ones that had been worked at a profit.

The papers by Mr. Gillham on the Transmission of Power in Operating Cable Railroads and by Mr. Ribeiro on a New Method of Calculating Cross Sections were read by title, and there was no discussion.

Mr. David L. Barnes read an abstract of a paper on the Distinctive Features and Advantages of American Locomotive Practice. There was no discussion of the paper; but Mr. Mendes Cohen and others said that it was a paper of great value, and one that could only be adequately discussed after careful study of it.

A paper on Railroad Signaling, by Mr. G. Kecker, of the Imperial German Railroads, Strasburg, was presented by title and briefly discussed by Mr. Hardy. The paper is a very careful review of signaling practice in various countries.

A paper on Surveys for Railroad Location, by Mr. F. A. Gelbecke, Baumeister Prussian State Railroads, Cologne, was read by abstract by Mr. Gleim and discussed briefly by Mr. Hardy and Mr. Nicholson. An abstract of this paper was published in the *Railroad Gazette* last year, and one will also be found in another column.

The paper on the Conversion of the River Clyde Into a Navigable Water-way was read by title only, and an abstract was read of the paper on the Limits Attainable in Improving the Navigability of Rivers by Means of Regulations, by Prof. H. Engels, of the Royal Technical High-School of Dresden. Captain Black, Corps of Engineers, U. S. A., spoke of this as a very valuable paper and discussed it briefly.

A paper on the Development of Quay Cranes in the Port of Hamburg, by Mr. Nehls, Chief Engineer to the Harbor Board, was presented by abstract by Mr. Gleim, who said that this plant is the pride of the harbor.

A group of papers on railroads in various countries was presented by titles only, and this was followed by an abstract of a paper by Mr. C. D. Purdon on Comparisons of Modern Engine Loadings in Bridge Calculations, which was discussed by Mr. Ward Baldwin.

In the evening Mr. F. W. Skinner gave an interesting lecture on American Methods of Erection of Bridges and Structures, illustrated by the stereopticon.

FRIDAY.

The first paper at the meeting of Friday was on the Building of Leixoes Harbor, by Mr. Soares, Inspecting Engineer in Charge. (An abstract appears in another column.) In discussing this paper, Mr. Griffiths said that in the harbor works of Dublin, Holyhead and elsewhere in the United Kingdom the breakwater described by Mr. Soares had been used, but had gone to pieces through the degradation of the rubble. In Dublin Harbor the rubble breakwater had been supplemented by concrete blocks weighing 40 tons, which had been moved 50 or 60 ft. from their place by the sea. These had been replaced by blocks of 140 tons which stand.

The second paper was a Description of the Lower Weser and Its Improvement, by L. Franzius, Ober-baudirector, Bremen.

Mr. Raebler read an abstract of this paper, in German, which was translated by Mr. Gleim. After the reading of the abstract Mr. Raebler asked for information as to the use of apparatus for stirring the bottom of a stream in order that the material might be carried away by the current. He said that the Weser, at the point where present improvements are being made, is a tidal estuary some 10 or 12 meters deep, and the Board in charge of the work has called for an international competition in apparatus for stirring the bottom. Captain Black described various expedients which had been used by the United States Engineers in various river works. One was a sort of dipper without a bottom, which was pushed over the bottom of the stream at various inclinations, stirring up the material. It had not been found useful, as such operations could only give permanent results by changing the conditions under which the channel had been obstructed. Another expedient had been to drive piles in rows on the high-water bar before the low-water channel was formed, thus inducing a scouring current. In other cases dynamite had been exploded on the bottom of the stream, and in still others a propeller loaded to very deep draft had been moored on the bar and a scouring current induced by the action of the screw. None of these expedients had been successful because the sand removed was deposited again very close to the place from which it had been washed away.

A paper on the Method Used to Secure the Stability of

a Quay Wall at the Port of Altona, on the Elbe, by Mr. Stahl, was discussed by Mr. Vedel, of Copenhagen, who made an excellent statement of general principles and of practice in South America and in Denmark.

A valuable group of papers on sewers and water supply was presented and discussed at much length in a very full meeting. At the close of the session the President, Mr. Metcalf, congratulated the members on the large attendance, the valuable papers and the interest and value of the discussion.

At this meeting an invitation was read from the Drainage Commission to an excursion to visit the drainage canal works on Monday by a train leaving at 10 a. m. from the Santa Fe station. On Friday evening a business meeting of the American Society of Civil Engineers was held, at which the President delivered the annual address, which is printed in another column.

The only business transacted at the business meeting of the American Society of Civil Engineers was the election of the Nominating Committee, as follows:

First District—George S. Greene, Jr.

Second District—Clark Fisher.

Third District—Fred Brooks.

Fourth District—Adolphus Bonzano.

Fifth District—C. L. Strobel.

Sixth District—J. B. Johnson.

Seventh District—John McLeod.

Friday evening the engineers in attendance at the Congress were invited to a reception in the Mining Building on the World's Fair grounds, as guests of the exhibitors in the Department of Mines. After the reception the engineers and their friends went through

was taken on a resolution to submit the question of the appointment of the committee to a letter ballot. The resolution was lost by a vote of 11 for and 54 against; thus the question of a code of ethics was settled for another year.

THE USE OF NARROW GAUGES.*

The paper by Mr. Ziffer on narrow gauges is a historical review of the development of gauges of railroads in different countries, a *résumé* of the gauges now used and a statement of the advantages and disadvantages of narrow gauges, the whole being an argument for the use of gauges of one meter or less for secondary roads and roads of local interest. The statement of gauges in actual use is of little value, for it does not give the miles of each gauge in use; therefore to say that, in Germany for example, the gauges in use are 1.435 meters (4 ft. 8½ in. or "standard") 1.00, 0.95, 0.90, 0.85, 0.79, 0.785, 0.78, 0.75, 0.73, 0.70, 0.68, 0.66, 0.65, 0.60, 0.58 and 0.54 meter, and not to say the mileage of each, is misleading, for these odd gauges are probably used on a very small percentage of all the mileage in the Empire. The summary given for the world is:

Standard gauge, 74 per cent.,

Broad gauge, 12 per cent.,

Narrow gauge, 14 per cent.,

and this is the only clue given to the importance in mileage of the various narrow gauges.

It appears that in France the standard gauge is 1.44 meters, and the other allowable gauges 1 meter, 0.8 and 0.6 meter. In Algiers the gauge is 1 meter. In Italy the

structure and lower speed of trains"; and, finally, that the yards and buildings can be smaller.

None of these claims are supported by facts and arguments, but are simple assertions. There are some examples given of narrow-gauge roads operated for 54 per cent., 64 per cent. and even down to 35.5 per cent. of the gross receipts; but the figures are not of the slightest value, for the roads cited are all short and working under special conditions; the rates are not given nor are we informed what the items of operating expenses are.

Compound Locomotive for the Lake Street Elevated.

The engravings printed herewith show the general features of the compound locomotive for the Lake Street Elevated Railroad, at Chicago, which was illustrated by a perspective cut last week. Fig. 1 is a side elevation, fig. 2 a cross-section through the cylinders, and fig. 3 a cross-section between the front and rear driving wheels. Fig. 4 shows a half transverse elevation at the tank end and half cross-section through the cab.

As noted last week, this engine was built by the Rhode Island Locomotive Works, the general plan being the same as that of the two-cylinder compounds built by these works for the Brooklyn Elevated. The main frames are of hammered iron forged solid. The guides are of steel, of the Laird type, and the cross-heads of cast steel. The driving wheel centres are 39 in. in diameter, fitted with steel tires 2½ in. thick and 5¼ in. wide. The axles are of steel with journals 6 in. in diameter and 7 in. long, the driving boxes of Damascus bronze, with wide flanges and heavy brass bearings.

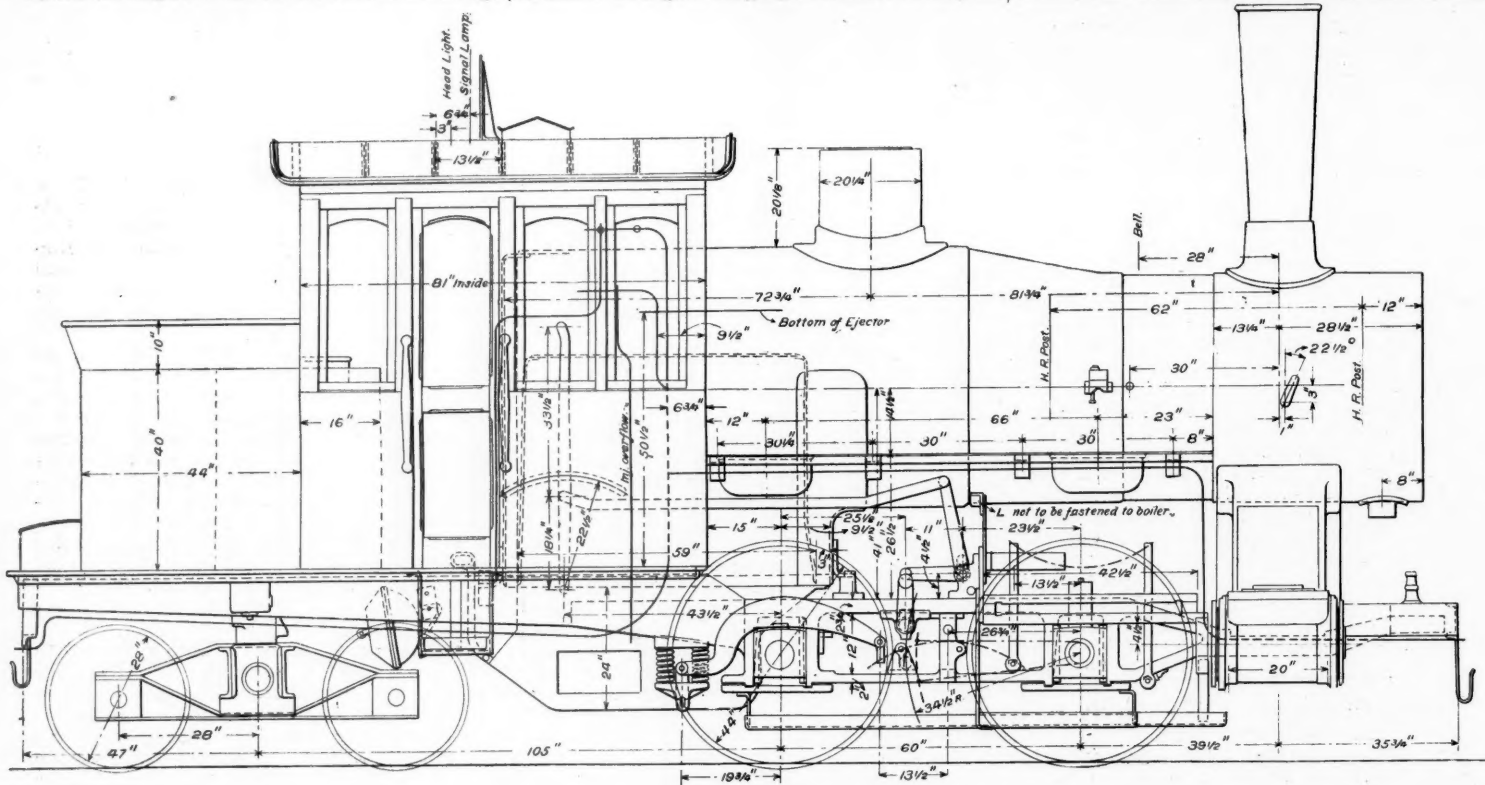


Fig. 1—Two-Cylinder Compound Locomotive for Lake Street Elevated Railroad, Chicago.

Built by the RHODE ISLAND LOCOMOTIVE WORKS, Providence, R. I.

the Midway Plaisance, and made the round of the Ferris Wheel, where they saw a most imposing and beautiful spectacle.

Saturday morning the divisions of the Congress met in general session. Mr. Chanute presided, and the chiefs of the various divisions made short addresses, telling the chief results and impressions of the Congress. The sum of them is that the Congress has been successful beyond all expectation, and that it will be an epoch in the history of the engineering profession.

BUSINESS MEETING, AM. SOC. C. E.

Wednesday evening a business meeting of the American Society of Civil Engineers was held.

The Committee on Standard Rail Sections reported and was discharged with a resolution of thanks for the labor, zeal and ability that the members had given to the service of the Society and the profession. The sections recommended distribute the metal about as follows: Head 42 per cent., web 21 per cent., flange 37 per cent. The top radius is 12 in., the upper corner radius 7½ in., the sides of the head vertical and the width varying in different weights. The sections vary by 5 lbs., from 100 lbs. down. The flange angles are 13 deg. and the web has a principal radius of 12 in., joining the head and flange by a radius of ¼ in. Mr. George S. Morison made a minority report dissenting only in the matter of the width of head. This he would make 2½ in. for all sections.

The matter of the appointment of a committee to consider the question of formulating a code of ethics was brought up. The Board of Direction had drawn up a synopsis of the arguments for and against, and recommended that no such committee be appointed. A vote

standard is 1.445 meters, and the minor roads use from 0.95 down to 0.75. In Belgium the standard gauge, 1.435 meter, is general and the secondary roads use 1 meter. In all the other European countries too the standard gauge is general, except Russia, which uses 1.524 meter, and Portugal 1.676 meters; but there is a great variety of narrow gauges in use. In India the broad gauge, 1.676 meters, prevails still, with meter gauge and even less on a few lines. In Japan the gauge is 3 ft. 6 in., and in Australia it is 4 ft. 8½ in., 5 ft. 3 in. and 3 ft. 6 in. This is a brief general statement of the gauge situation aside from North America, where, as we all know, the 4 ft. 8½ in. gauge (1.435 meters) is vastly predominant, and increasing its predominance.

The advantages claimed by Mr. Ziffer for narrow gauges are: (1) Saving in construction; (2) saving in the purchase of rolling stock; (3) saving in operation. The disadvantages, which the author states but does not admit, are: (1) Less capacity; (2) greater cost of operation; (3) cost and trouble of transfer of traffic at junction points.

The argument advanced to sustain the claims for advantage are the assertions with which we were very familiar 20 years ago, that steeper grades and sharper curves may be used and therefore the line can conform closer to the ground; that the cuts and banks can be narrower and quantities moved less; that lighter rails and bridges can be used because of the less load on wheels; that the cost of the equipment diminishes with the gauge; that there is a less cost of maintenance and inspection because of "lighter construction of super-

The connecting and parallel rods are of steel, forged solid, with straps and keys on the main rods. The side rods are without keys. The engine truck is of the centre bearing swing motion type with side bearings. The truck axles are of steel with inside journals 3¼ in. in diameter and 6 in. long.

We reprint some of the items from our description of last week.

Total weight in working order.....	60,000 lbs.
Weight on drivers.....	43,000 lbs.
Weight on truck.....	17,000 lbs.
Type of boiler.....	Wagon top, extension front
Thickness of boiler shell.....	7/16 in.
Steam pressure.....	180 lbs.
Number of tubes.....	188
Diameter of tubes.....	1½ in.
Length of tubes.....	6 ft. 8 in.
Grate.....	68 × 42½ in.
Type of firebox.....	Radial stay
Thickness of side sheets.....	7/16 in.
Thickness of back sheets.....	7/16 in.
Thickness of crown sheets.....	7/16 in.
Thickness of flue sheets.....	7/16 in.
Fuel.....	Anthracite coal

Annual Address of the President of the American Society of Civil Engineers.

It would seem on this occasion of a general gathering of the nations to celebrate one of the greatest events of history, and to illustrate by their products the wonderful advances made by men in this most enlightened age, as if the annual address should deal more in a general view than in a specific rehearsal of the events of a year, or of the works alone of the present day.

So far as we are informed by history or as we can learn by the study of ancient ruins, we know that there have been always great engineers in the civilized world.

* Notes of a paper by E. A. Ziffer, C. E., presented at the Engineering Congress, Division A—Civil Engineering.

From the time when man was first directed to go forth and subdue the earth, to the present day, we know that men have always been engaged in gigantic efforts either to destroy one another, to better the condition of the people, or to rear useless monuments to pride and vanity. Such efforts continue to this day, but they are mainly directed in one way or another to the betterment of mankind, by a reduction of exhausting toil, and by a wider diffusion of comforts.

What better illustration could we have of the power of engineers in the present day than the wonderful White City which is so much admired by all. Here adaptability, roominess, comfort and convenience are made beautiful in every detail by the most perfect art. Out of the swamp has sprung up, as it were in a night, this marvellous city, outdoing the imaginings of the Oriental mind and paling the light of Aladdin's lamp.

Mr. Metcalf then gives a brief review of the work of the ancient engineers. Continuing he says:

Among these monks was formed a mendicant order called Pontifex, or Bridge-Builders. This order continued for several centuries and wound up its work in one Romain, who, after previous good service under Colbert, became one of the earlier engineers in the Corps de Ponts et Chaussées of France. The Pontifex may be called the first Institution of Civil Engineers of which we have any knowledge. At the time of Columbus the Pontifex were of little repute, if, indeed, they were known at all; engineering was devoted mainly to architecture, architecture chiefly to the building of churches and palaces; art was given up to the adornment of these and little heed was given to the welfare of the people.

Yet there were great men and brave men in those days, of which we need no better proof than a glance at the copies of the caravels that brought the discoverers to our shores across the then unknown seas. To all who saw these caravels lying in the Hudson River beside the great steam vessels of to-day nothing need be said about the advances of engineering in the last 400 years. The history of four centuries lay there epitom-

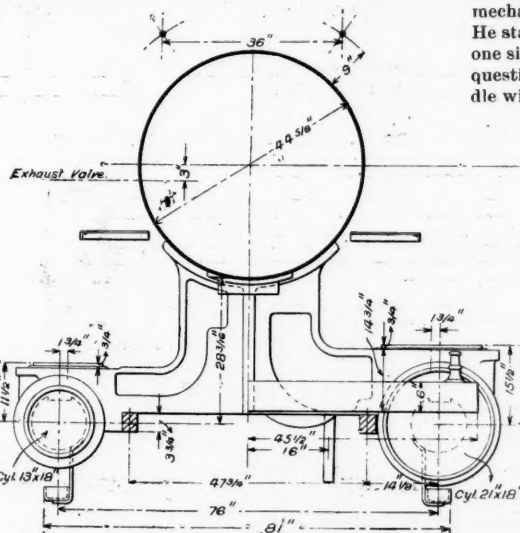


Fig. 2—Cross-Section through Cylinders.

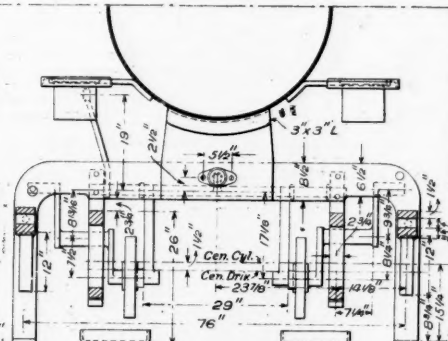


Fig. 3—Cross-Section Back Between Front and Rear Drivers.
Compound Locomotive, Lake Street Elevated Railroad.

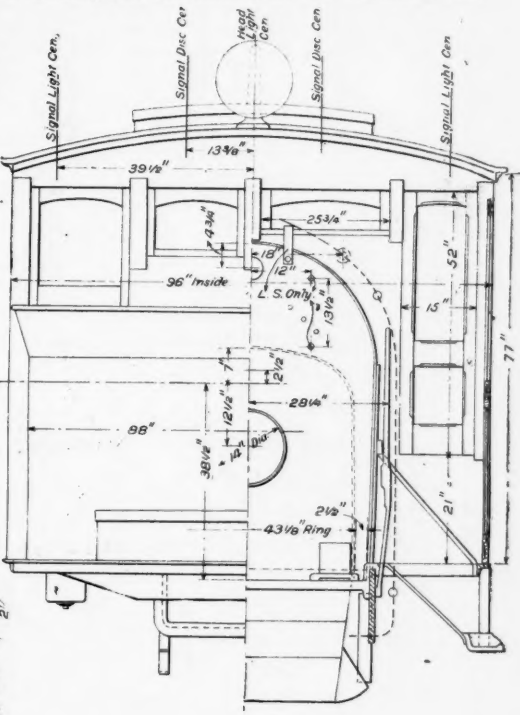


Fig. 4—Half Side Elevation at Tank End and Half Cross-Section through Cab.

ized to be taken in at a glance. And even if the great fleets lying there were machines of destruction, compared to the works of peace on all sides of them they were as nothing.

The very power of these war vessels makes for peace; the skill, the ingenuity and the destructiveness developed in the works of the naval and military engineers are all in favor of peace; these works are so destructive and so enormously expensive that the nations are growing afraid of war, so that the very power of these engineers tends to the ruin of their branch of the profession and we welcome them into our societies gladly as brother engineers and promoters of harmony.

Of the future of engineering, both as a lucrative profession and as a promoter of good, much might be said. The Siberian Railroad across Asia, to be followed by many thousands of miles of branch lines, must certainly arouse the misty East from its lethargy and animate those great peoples with modern energy and the spirit of advancement. The building of railroads and opening of waterways into and through the wilds of Africa will bring light into the "Dark Continent," put an end to the terrible cruelties which are practiced upon inoffensive peoples and dispel the terrors of ignorance and superstition. The building of the Trans-Andean Railroad and the cutting of the isthmian canal will unite the Western continents into a brotherhood of peaceful, happy nations; for before these works are completed our military members will have made war altogether too expensive for sensible people to indulge in.

But if the building of more railroads and the digging of more canals are to be considered rather as advancing upon good old lines than real development, there is much other work for the engineer to do in the way of true development. The engineer is the guide, or the pilot, of human energies: he has on one hand the vast

mass of laborers to organize and teach to produce the greatest results with the least effort. He has the great army of mechanics ready to furnish him with every useful tool he can call for, to increase efficiency and reduce cost. He has also the smaller, but most potent, body of men, the scientists, to make known the unknown, to open new roads, and to discover the causes or sources of danger, such as the all-devouring bacteria, "greater than an army with banners," which the engineer must destroy for the good of the people. . . .

Engineering then is much more than the designing and building of structures, ships, roads and canals. It involves the economic use of labor on one hand and the proper application of capital on the other; the one must be employed fairly and justly, and the other must be applied so as to yield a reasonable return. That engineers have been successful in both is shown abundantly in the facts that we have now the cheapest, quickest and safest means of transportation the world has ever known. We have the most economical and best distribution of food, clothing and all of the comforts of life, and in many ways the most even distribution of wealth. By means of the almost instantaneous spread of intelligence, and by quick modes of transit of great quantities of material, severe or long-continued famines have become almost impossible in the enlightened parts of the world. So, too, a knowledge of sanitary laws enables us now to meet and suppress many epidemic or contagious diseases, which, in the time of Columbus, would have swept over the earth unresisted, decimating the nations until the virus was exhausted, or all weak persons were carried off.

These are the grandest triumphs of engineering, they are the beneficent efforts of the great works of engineers; huge bridges and magnificent structures of all kinds appeal to the eye and excite admiration; the greater comfort and wellbeing of the people appeal to the better feelings and should excite gratitude.

More than 2,000 years ago a sage wrote that the mechanics are the men who will maintain the state of the world; true then, the statement is equally true to-day, and the engineer is but the highest development of the mechanic through the evolution of the centuries. . . . He stands as the guide and the arbiter, just to labor on one side and honest to capital on the other; if social questions are out of his province, and he may not meddle with them, he may at least, and he will, be true to

his high position and great trusts, and so help to hasten forward that era to which all eyes are turned, the era of "Peace on earth, goodwill toward men."

A Proposed Method of Testing Structural Steel.*

BY ALFRED E. HUNT, M. AM. SOC. C. E.

Mr. Hunt puts out this very original and ingenious method for criticism and suggestions rather than as being completely worked out in its details and results. Nevertheless, he presents a considerable body of facts gathered from actual experiments in the Pittsburgh Testing Laboratory.

Some of the disadvantages of the present methods of testing structural steel are the time, the expense, the lack of a sufficient number of tests in any given case, the varying results obtained by specimens from different parts of the ingot and from varying methods of testing, as, for example, in the time and the method of application of strains. A further disadvantage, although not inherent, is the narrowing of the allowable limits of results to an excessive exclusion of material. This is unjust to the mills, unsatisfactory to the shops, and is actually prejudicial to the interests of the engineers who draw the specifications, and sometimes to the quality of the metal entering into the structure, as it tends to lower the ideas of the "practical men" as to the utility of specifications. Again, bending and drifting tests do not give results in numerical quantities convenient for reference and comparison.

The method proposed by Mr. Hunt consists in punching or otherwise shearing, cutting or drifting pieces of

a given thickness, and comparing the force required in this work with that required to treat standard pieces in a similar manner. The comparison can be made also with the work done at different stages of the punching, etc., with results obtained in treating standard pieces in a similar manner. He uses the term "work" to express the force necessary to punch a given hole or cut a given notch or drift a given hole, multiplied by the space through which the force moves, and by the time during which the force acts. In practice a combination of the first of these factors with the second or third is often used, and it is the combination of force and space that the author has so far found to be the best and most accurate way of using the method.

The most convenient application of this method is by plotting curves in which the ordinates represent the force in pounds and the abscissæ represent the increments of space, and he uses a mechanism by which the curve is drawn as the work is done. By this method tests can be readily made on crop ends of pieces rolled from each ingot in any given lot, or crop ends taken from each end of large plates or bars, and this ease of getting samples and making tests is a great practical advantage. In fact, it will be practicable to equip the punches used in shops in actual practice with some device for measuring the work done in punching, and so a record can be kept of the characteristics of every piece of metal punched.

The characteristics of the metal developed by this method are ductility as compared with its tensile and shearing strength; and experiments show that the means of selecting good structural steel and discarding that

which is unsuitable can be devised by this method of testing its quality.

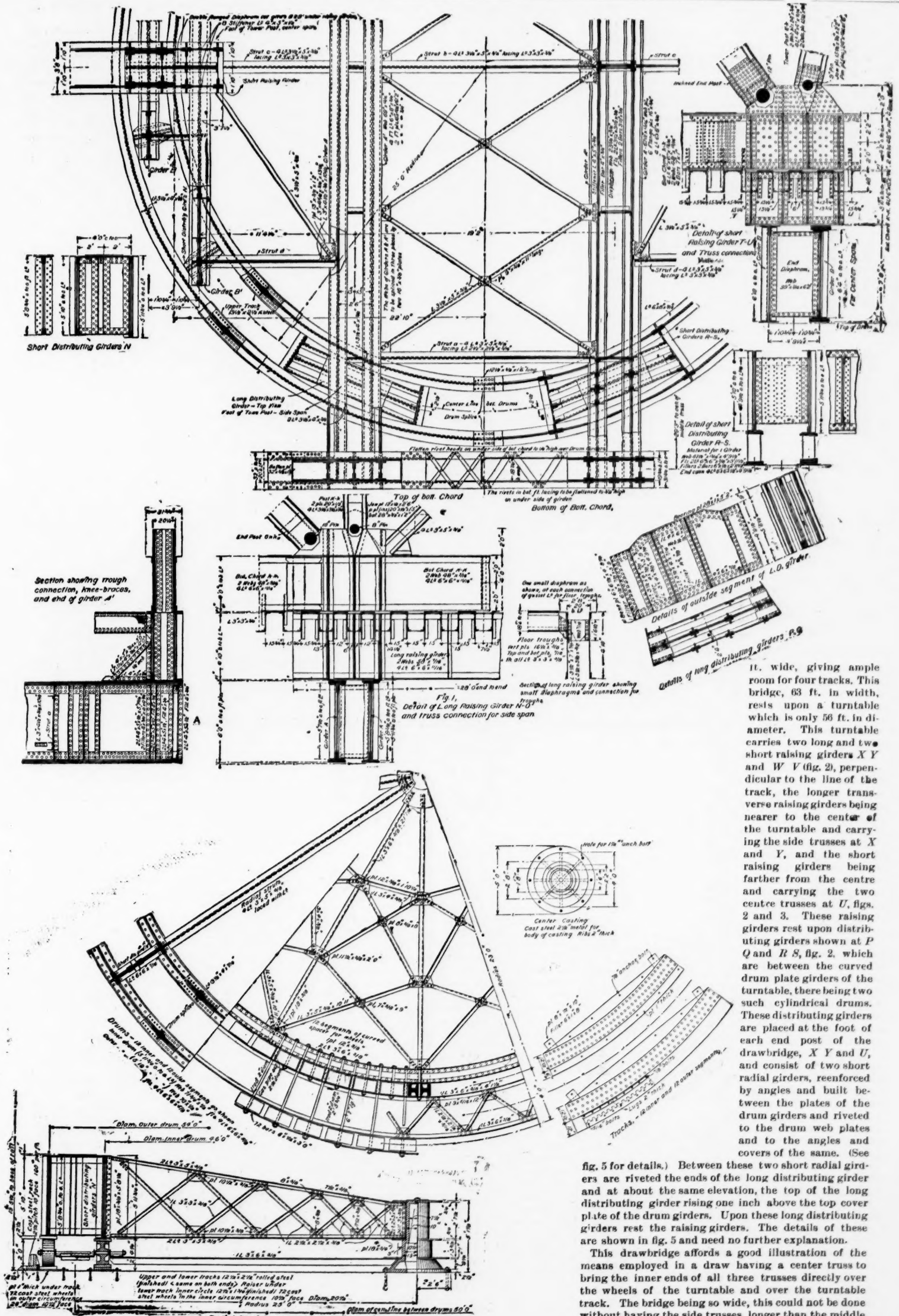
Mr. Hunt does not claim that this will give in all cases the tensile strength of the metal, but that it suggests a means of testing for that combination of strength and ductility desired in structural steel. It does not, for instance, distinguish steel of 65,000 lbs. from that of a higher tensile strength unless the ductility is correspondingly low. Steel of 70,000 with 27 per cent. elongation in 8 in. might be accepted by this method in place of steel 65,000 lbs. on account of its exceedingly good ductility, but steel of 70,000 lbs. tensile strength and an elongation of 18 per cent. in 8 in. would be rejected. It is the author's judgment that this system of testing the quality of steel can be safely and conveniently used for structural material, and that it is sufficiently sensitive to exclude all questions of bad steel and that which is unsuitable, but that it will take a large amount of testing and experience to develop all the facts regarding this.

Colorado Coal Mining Traffic.

The coal trade of Colorado has been greatly delayed by the financial conditions, but the storage orders from Nebraska and Kansas have begun to come in since the first of the month, and the Colorado companies now figure upon almost as large a trade as that of last year. There will be no trouble about finding miners this fall and winter. The mines will probably run during the winter months. The United Coal Co. is now shipping 40 carloads of lignite coal to Colorado points. This company is working the new mine of the Solar Coal Co., in Walsenberg, besides the other coal mines of the company.

The Colorado Fuel & Iron Co. early in the year expected to be working its new mines on Crystal River, but had to suspend work upon its new railroad, the Crystal River road.

*Abstract of a paper read at the International Engineering Congress, Chicago, August, 1893. Division A, Civil Engineering.



TURNTABLE FOR HARLEM RIVER FOUR-TRACK DRAWBRIDGE—N. Y. C. & H. R. R. R.

extend farther back upon the curve of the turntable track. The end posts of the side truss extend back a distance of 46 ft. 2 3/4 in., while the center truss end post covers but 32 ft. 11 3/4 in., the difference, 13 ft. 3 in., being the depth from the crown of the arc to the chord width of the bridge, which is the long raising girder. With this exception of the inclined inner end post the side and center trusses are identical, thus preserving the symmetry and beauty of the bridge. A nice problem came up how to connect these inner end posts of the center and side trusses with a portal. It was accomplished by riveting to the center end posts a triangular plate, widest at the bottom, giving a slant equal to that of the side posts, so that the portal in passing from side to center truss is in a plane instead of being broken at the center truss. The center bent of the tower being the diameter of the turntable in width at the bottom, and narrower at the top, makes it unsymmetrical with the side bents of the tower, but this does not detract in general from the appearance of the bridge, for it gives a hexagonal shape to the tower, which gives, if anything, an impression of greater stability. The power-house is artistically designed and built into the tower over the tracks and directly over the foundations of the draw. It will contain two 50-H. P. steam engines, which will be furnished by Edwards & Co., of New York, who have the contract for the entire rotating machinery. Though the inner end posts of the side truss are much longer, and extend over two full panels, while the center end post covers two shorter panels, the upper ends of all three end posts are all in the same line. This is so designed that the whole bridge may be suspended by eye-bars from the top of the tower to these corners, enabling it to be swung. This is shown fully in the illustrations, figs. 1 and 2. The stress sheet requires no comment, as it is given in full in fig. 1.

The details of the shore end of the side truss are shown in fig. 4, and need no comment. The same order of construction is followed throughout the bridge, and it is not necessary to give the other trusses.

Another feature of the bridge, which to the writer is a new one, is the manner of joining the two parts of the counter braces. The usual manner is by turn-buckles, but as is shown in fig. 4, second and third panels

The general description already given of the turntable together with the detail drawings, figs. 5 and 6 will give a pretty complete idea of its construction. The tracks or bearing surface of the turntable over and under the wheels are 12 1/2 in. wide by 2 1/4 in. thick, rolled steel (finished), set upon its flat side. There is a raiser under the lower inner track of 12 1/2 in. x 1 1/2 in. finished steel. The table is carried upon 72 coned cast steel wheels, 10 1/2 in. face and 20 1/2 in. diameter for the

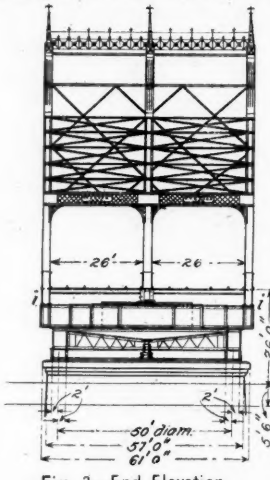


Fig. 3—End Elevation.

inner track, and 72 cast steel wheels 24 in. in diameter and of the same face, on the outer track. These wheels are not radially opposite to each other, but alternate, and are each upon a separate axle. They are held stiff by a radial frame and separators between the circular arcs carrying the wheels. See fig. 6.

The general specifications require that all material used shall be acid open hearth steel. The thickness of the web plates are to be measured on edges of plates, all bent angles and connection plates to be annealed, and castings throughout the entire bridge to be of steel.

The bridge, upon the whole, presents a very symmetri-

cal appearance. It is connected with the old tracks by temporary trestles. The foundations for this new bridge will be built upon the site of the old two-track draw. The old pier, which is built upon piles driven down about 46 ft. below high water, will be removed. It was 36 ft. in diameter, while the new pier will be 71 ft. in diameter. The new pier will be constructed upon a pneumatic caisson 71 ft. in diameter by 12 ft. high, upon which will be built a crib of 12 x 12 timbers. It will be octagonal shape and of concrete up to within 30 ft. of mean high water. It is expected to have to go down about 90 ft. to bed rock. There will be therefore 12 ft. of pneumatic caisson, about 50 ft. of concrete and 30 ft. of random range and finished ashlar, the random range coming up within 3 ft. of mean low water. It is expected to find the substrata gneiss. The landing or shore piers will not have to be carried so deep, though it is intended also to build those by caissons. The one upon the south side will probably be 60 ft. deep and upon the north side 50 ft.

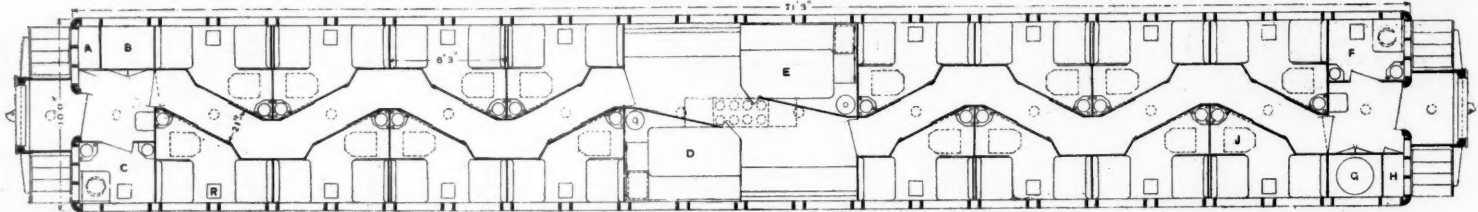
The engineer who has designed and will be in charge of the foundations is Mr. G. F. Boulard, Resident Engineer of the road.

The Allen Hotel Car.

The Allen hotel cars, four of which are being built at the Jackson & Sharp shops, Wilmington, Del., are to be run in special excursions, managed by Mr. William H. Church, from Boston to the World's Fair, starting by the Fitchburg road.

In these cars, designed by Mr. E. G. Allen, General Superintendent of the Old Colony, there have been introduced various novel arrangements which we have not hitherto seen. Some of these features are shown in the diagram of the floor plan, which we publish, and a sketch of some others, from the Excursion circular, follows:

These cars are 77 ft. 3 in. long over buffers and 10 ft. 3 in. wide. They have six-wheel trucks and the longitudinal sills are made of I beams, of which there are four. In the middle of the car, for a length of about 25 ft., there is a depression, giving a second floor about 30 in. below the normal level, and in this depression are carried the range and other kitchen fixtures. According



THE ALLEN HOTEL CAR—FLOOR PLAN.

A, locker; B, linen closet; C, women's water closet; D, pantry; E, kitchen; F, men's water closet; G, linen closet; H, locker; J, foot-bath tub.

these are to be riveted firmly together by splice plates. The outside plates are riveted to one end of the connection in the shop and the holes drilled in the plates. After the bridge is erected and jacked up in place so as to bring the direct diagonal braces in tension, the counters are then brought together, drilled and riveted, making the bridge members all solid and continuous throughout. To prevent tipping and to seat the shore ends of the trusses, the bridge seats are to be lifted by a screw lift operated from the power-house. It was first suggested that this be effected by lengthening and shortening the upper chords or tie-bars connecting the trusses with the tower, but after consideration the idea was abandoned.

The floor system is the New York Central standard trough floor, made up of plates and angles, which plates are all placed horizontal or vertically, making a rectangular cross-section. The troughs are 15 in. wide by 18 in. deep, and are made of steel. The advantages of this system of floor in this particular bridge were very great, as it afforded the best possible shapes and conditions for fastening to the lower chord of the trusses and of working around about and in between and adjusting to the stiffening parts. A floor system in which the troughs are oblique to the vertical could not have been adjusted to the vertical angles used as stiffeners upon the lower chords with the success that these rectangular troughs were connected (fig. 4). An innovation has been introduced in the fastening of the rails. Instead of filling the floor with concrete or earth and placing sleepers therein, the rails will be bolted directly to the built steel troughs, with a steel shim 8 in. x 1/2 in. x 11 1/2 in. between the rail and top plate of trough. The shim is riveted to the trough and the rails are clamped to both by beveled clamps and bent bolts, the track being insulated with vulcanized fibre so as to permit the use of track circuit signals. It is to be presumed that the noise likely to come from a train passing over such a track system has been considered, and no unpleasantness anticipated (3).

The tops of the trusses are braced laterally by transverse compression members built of four angles 3 1/2 in. x 3 in. x 3/8 in., laced together with 2 1/2 in. x 1/2 in. bars, and by angle bars 5 in. x 3 1/2 in. x 3/8 in. for diagonals (fig. 4). This system is riveted to the upper chord of the bridge. No lateral bracing is provided for the lower chords, but the trough floor system is depended upon to provide against all wind pressure and lateral motion.

cal and pleasing appearance. If any criticism were to be made from an artistic standpoint it would probably be upon the connections between the top of the tower and the angle of the upper chord and inner end post. The appearance of the bridge when swung is that of two, very heavy trusses suspended, as it were, by light tension members. The bridge would have a stronger appearance if these tie members were built members instead of bars, so as to have a heavier appearance to the eye. Perhaps, if entirely of built members, it would have too heavy an appearance, and the use of narrower tie bars is objectionable because of the greater difficulty to forge, and besides making it more expensive. From an engineering standpoint no doubt the bridge is more pleasing as it stands, but to the artist or photographer or average layman it has a weak appearance at that point. Another point noticeable as one looks at the bridge from the side is that there is no counter in the fourth panel from the tower, one of the two middle panels. Probably the necessity of a counter does not exist because the bridge is so heavy and the dead load so great, but at first sight there appears to be something omitted and that there is a quadrangular shape space there which is at least unusual in the middle panels. If an enormous load were concentrated upon the inner end of the span covering in part this panel there might be need of a counter, though no doubt the matter has been thoroughly investigated and the dead load is far too great to ever have such a condition. We have no doubt but that these points have had careful investigation by the engineer and that the strength, economy and beauty of the whole structure and of every part have been carefully considered.

This bridge when constructed will be probably the widest and heaviest draw ever built (4) and is said to be the only four-track drawbridge in the United States and possibly in the world. The solid floor system, together with the heavy dead load of the trusses, makes it an extremely heavy bridge. It has been designed with a view to the increased demands required by the heavier rolling stock adopted year by year. The contractor for the superstructure is the King Bridge Co., of Cleveland, O.

Foundations.—In order to carry on this work without interrupting the regular traffic of the road a temporary bridge with a lift in the centre of the stream has been erected at a distance of 210 ft. west of the old bridge.

to the floor plan this arrangement makes a break in the main aisle of the car, but there is nothing in the description to explain how this apparent inconvenience is obviated. Each room has a lavatory with hot and cold water, a tank for drinking water, a foot-bath tub set in the floor, a gas light, an incandescent electric light, an electric fan and the other usual conveniences. Unlike the Allen sleeping cars on the Shore Line, each section has an upper as well as a lower berth.

Each section is separated from its neighbors and from the aisle by board partitions, and each has a register in the floor for admitting hot air heated by the steam pipes beneath. As before noted the kitchen is in the centre of the car and meals are served to each passenger in his room. The upper berths are closed in the day time by drapery, in such a way as to admit of "ventilation" of the bedding. There are 16 compartments, accommodating 32 passengers. The small square shown in the drawing in each compartment indicates the location of the heat-register. Adjoining rooms may in some cases be thrown together by opening a sliding door. These cars cost about \$20,000 each.

Surveys for Railroad Location.*

BY F. A. GELBEKE, BAUMEISTER, COLOGNE, TRANSLATED BY R. P. MILLER

Mr. Gelbeke's paper is interesting as showing how an American engineer never would make a railroad survey and how it might be done in a very thickly settled and well mapped country by an extremely painstaking engineer with whom time was a minor object. The subject is divided into four heads: 1. General Investigations (reconnaissance). 2. General Survey (preliminary). 3. Detailed Survey (paper location). 4. Field Location and Preparation of Expropriation Plans.

1. General Investigations.—The first consideration is as to the probable usefulness, cost and earning power of the proposed road. In the older civilized countries topographical maps on a scale of 1 to 100,000 may easily be had; but even these must be supplemented by the indication of water courses and the determination of elevations. Besides these, the populations of various centres, such as cities, large industrial establishments, and the location of mines and forests and the like, should be indicated. Populations should be

*Abstract of paper read at the World's Engineering Congress, Chicago, August, 1893. Division A, Civil Engineering.

indicated by circles which might be tinted. Thus, the general location of the line can be determined. For this general investigation it may become necessary to have maps of parts of the territory on scales as large as 1 to 20,000, or 1 to 10,000. Such an investigation can be made for from \$8 to \$16 per mile.

2. The general survey will serve to determine the cost of the construction accurately enough for the estimate for the necessary capital. In this survey the nature of large stretches of country must be investigated and data must be acquired for the preparation of a map of positions and elevations. Such a map will be made to best advantage on a scale of 1 to 2,500, or, under some circumstances, 1 to 5,000; and for a general review of the subject another map should be constructed on a scale of 1 to 10,000. In this survey the barometer is used for determining levels and in the hands of an experienced engineer it is an efficient and sufficiently accurate instrument. The author describes an approved but unfamiliar method of using the barometer for such surveys. A corps of about five engineers is equipped with four levels and level rods, three sextants, eight aneroid barometers, one or two barographs and three thermometers. Besides these tape measures, sighting rods, etc., will be necessary, and every engineer should have one assistant to carry instruments and keep notes. The barometric altitudes must rest on a network of elevations determined by spirit levels, taken at such distances that the readings of the aneroids may be made at intervals of from half an hour to one hour. To determine the changes of atmospheric pressure during the progress of the work, the barograph is used, which is an aneroid barometer, that automatically registers the pressure, on a strip of paper moved by clockwork. This may be dispensed with if the heights determined by spirit levels are so close together that every engineer can read his aneroid at a known altitude not less than every half hour.

On the maps the stations of known altitude are to be plotted, and the intermediate elevations from the barometers filled in, using a pedometer to determine the distances. The width of the territory covered by such a survey should be about 1.5 kilometers and the barograph should be so placed that the aneroids will not get further from it than about 15 kilometers.

An engineer of average experience with one assistant can determine about 100 stations in a hilly district in one day and very experienced observers can double this. The stations are from 100 to 120 yds. apart. The heights from the barometrical observations are calculated graphically, a diagram for the purpose having been invented by Steinach in 1881. A careful observer can depend upon accuracy within one or two meters.

The contours are then plotted on the maps together with all details of topography and structures. Furthermore, highwater marks should be written down in blue, and so the width and height of every ridge and culvert; also the character of the soil and rock.

Staking out of the line is not necessary, and, indeed, should be avoided, as all the facts can be taken from the map and setting stakes may interfere with the plan by enabling property owners to speculate on the line. As a sequel of this survey, the route is laid down on a map to a scale of 1 to 10,000 with a profile on the same horizontal scale and a scale of 1 to 500 vertical. Sketches of the larger structures and of the track and switch work at yards are to be made. This is considered the most important of all the preparatory work, and it can be done at a cost of from \$40 to \$80 a mile.

3. The Detailed Survey.—It now becomes the duty of the engineer to make surveys from which to prepare study maps containing everything necessary for the preparation of the project in detail. These should be to a scale of 1 to 1,000 and cover a strip of land from 100 to 200 meters wide. For this survey a theodolite with stadia wires is used. The force is divided into small parties, each party consisting of two engineers, a recorder, a boy to hold an umbrella and give signals and two or three rodmen. The instruments are the theodolite with tripod and hood, a tape line and reading rods. A traverse line following approximately the proposed line of railroad is laid out, the levels at the angles of the line being exactly determined to serve in future as bench marks, and these are to be fixed as permanently as possible. The traverse line is staked out and plotted on a scale of 1 to 1,000. A practiced engineer can determine about 100 points a day with this instrument. The reckoning of the distances from the instrument stations and the elevations may be very rapidly done by special slide rules. Contours at differences of one meter in elevation are plotted and all the features of the country are laid down with great fullness and accuracy. Test pits are to be made from which to determine the cost of handling the material and the capability of the ground for carrying weight. These are to be indicated in the map with marginal notes. On the map so prepared the engineer makes the location, taking profiles and cross-sections from the map from which to make earthwork calculations. From the map and its notes he can also design and estimate on all structures. Thus the detail location of the road and detail estimates can be made without actually locating the line in the field; but for a general view of the line it is well to prepare a map on a scale of 1 to

2,500, which is most conveniently done by photographing down the maps already made on a scale of 1 to 1,000. This must, of course, be supplemented by a profile. This part of the work can be done at a cost of from \$400 to \$800 a mile.

4. The field location consists in transferring the line from the maps to the field. The line is staked out from the traverse line already laid down and a profile made connecting with the bench marks on that line, and the whole work is cross-sectioned. Property plans are prepared on a scale of 1 to 1,000, but before construction is begun it is necessary to revise the location in detail and in some places to improve and supplement it. This latter, however, belongs to the construction, and the survey is assumed to have closed with the preparation of the property plans. This last survey will cost from \$160 to \$320 a mile, making the total cost of all the surveys \$600 to \$1,200 a mile.

The author closes by saying that the cost of thoroughly prepared surveys is seldom more than that of defective surveys, and the difference disappears in the saving made by a good location; and he advises his colleagues to do extra work in the thoroughness of the surveys rather than to slight them.

The Lunken Gate Valve.

In the march of progress there are few industries in which there has been less invention displayed than in the valve-making industry. The valves of to-day are the same as were used 50 years ago, and the same defects they had then are still complained of. The ordinary globe valve, on account of its crooked and cramped passage, is a very imperfect valve, which probably accounts for the increased use of straight-way or gate



Fig. 1.



Fig. 2.

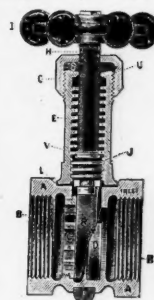


Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.

valves. The wearing parts of valves in the market to-day are not renewable, which necessitates the purchase of a new valve when the seat or slide becomes cut or much worn. A valve shell, when once in place, should last as long as the pipes connected with it. Manufacturers have done much to cheapen the production of their valves, but the chief item of cost is the work of replacing a leaking or worn-out valve, which, besides, causes untold annoyances and inconveniences. To meet this needless expense and trouble the Lunkenheimer Company, of Cincinnati, O., have placed upon the market a gate valve whose interior working parts can be renewed without taking up the valve shell. It has all the essential features necessary to make a perfect valve. The company offers it to the trade with much confidence, based upon observation and experience, and believe that it will prove in every way efficient and economical.

The valve may be described by the aid of the accompanying cuts. Its shape is not unlike the usual form; the hub and bonnet is fastened by a coppered steel U strap bolt, surrounding the shell with its ends passing through the ears of the bonnet and secured by nuts. See fig. 1. Any lateral movement of the U bolt strap is prevented by projections on the shell. The joint is packed by a hard lead washer, 1-64 in. thick, the top faces of the flanges each having a groove to properly secure the washer. The valve can easily be taken apart without renewing the packing washer. The hub or bonnet is flat and narrow, and just of sufficient size to receive within it the valve disc when entirely raised, and has sectional or part-nut threads on its opposite interior sides. The threaded portion J, fig. 3, of the stem by engaging with these part threads causes the valve to be opened or closed. The disc has a straight flat face or bearing against the renewable seat C, and is forced tightly against it by the self-adjusting wedging half-ring or horseshoe D, secured loosely in the valve shell. The wedging on the disc is applied on two wedging surfaces diametrically opposite each other, these coming in contact with the beveled ends of the half-

ring or horseshoe wedge; thus the wedging pressure is properly equalized on the entire disc and insures a tight joint on the opposite face. The pressure of the steam or liquid on the back or wedge side of the disc also aids to makes a tight closing valve.

All valves above 2½-inch size are provided with "by-pass," which arrangement balances the disc before opening the same, and thus reduces the friction and wear on seat and disc to a minimum, and makes the valve open easily, regardless of what heavy pressure may be on it. This "by-pass" is shown in fig. 2, and, briefly explained, is an auxiliary valve formed in the top of the valve disc. It is operated by the valve stem automatically, while opening or closing the main valve C. Channel N, passing through the disc, connects the inlet or pressure side of the valve with the outlet side, and the end of the stem H controls this channel, there being sufficient play in the disc coupling to allow the complete opening of channel N caused by the first one-sixth turn of the wheel in opening the valve.

The renewable seat is an exteriorly threaded flanged ring, fig. 5, that screws against a face or shoulder of the flange, the opposite side of which flange forms the seat or bearing surface for the disc to close against. The inner periphery of the renewable seat has lugs or teeth K, fig. 6, for the engagement of the spanner end M of wrench, plate B, by which means, after taking off the bonnet E, the seat is tightened or loosened through the disc opening of the body without disturbing the pipe connections. In iron body valves the renewable seat C screws into a second brass ring, permanently fastened in the iron shell; otherwise, owing to the rusting qualities of iron, the removable seat might rust tight in the shell. The ring end T of wrench is used to hold and guide the removable seat into place, so as to properly start its threads into the threads in the shell. Fig. 4 shows how the new valve seat is inserted. In a few minutes and with perfect ease any person can practically make a worn out valve as good as new, the cost of the renewable seat or a new disc being but trifling.

Another important feature is that the stem, when the valve is full open, seats itself (V against U), thus relieving all pressure on the stuffing-box, and permitting repacking under pressure. The tie-band surrounding the shell adds greatly to the strength of the entire valve and permits of its being taken apart easily with a small wrench. The shell is so short and rigid, and the wedging surfaces are so small, that expansion and contraction do not affect it. Thus the disc never wedges fast, so as to become inoperative. Having but a single disc, and the wedging half-ring taking the place of a second disc as a wedging resistance, this construction overcomes the objection in double disc gate valves, where liquids remain in the shell between the discs, and freeze or injure the valve. Things do not lodge on the seat of this valve, because the disc and seat have a parallel straight face; and as the pressure on the back of the disc keeps it tightly pressed against its seat, it actually cuts away (like the action of the blades of a pair of shears) anything in its path. This feature, combined with the renewable seat, commends this valve for blow-off purposes. As regards outside finish, the shape and construction are such as to necessitate only the finishing of the stuffing-box, the balance being left a smooth casting, while the steel band and nuts are drop forged, and copper plated to prevent rust.

The engraving shows the special features of the valve.

The City & South London Railway.

LONDON, July, 1893.

The fifth half-yearly report has just been published, and the results for the first six months of 1893 show an improvement, not great, but steady enough to promise better things when the proposed extensions, now authorized by Parliament, are carried out.

The receipts from all sources have been \$115,795, and the cost of working \$74,820, showing a ratio of expenses to receipts of about 65 per cent. The net revenue, including balance brought forward from last year is sufficient to pay full interest upon the bonds or debentures and debenture stock (amounting to \$873,150 at five per cent. and four per cent. respectively, out of a total created capital of \$5,125,000), also upon the five per cent. preference shares, and a dividend of ½ per cent. on the ordinary stock. This seems small, but even now the company pays the same dividend on the ordinary shares as the Great Eastern, and a very much better one than the London, Chatham & Dover ordinary shareholders ever expect to get. The passenger traffic is much greater during the second half of each year than the first half. The line was practically opened at the beginning of 1891; for the first six months of that year the number of passengers carried was 2.4 millions. In the second six months it rose to 2.7, an increase of 3 million. For 1892 the numbers were 2.8 and 3.2, showing increases respectively of .1 and .4. The number carried during the first half of this year was 3.1, showing a slight reduction as compared with the previous six months, but still higher than for the corresponding period last year.

The train-miles run have been 217,664 in number, to do which coal and coke to the value of \$9,225 has been burnt. This gives an approximate cost per train-mile for fuel alone of about four cents. The weight of fuel used per train-mile, as far as can be calculated, is some where in the neighborhood of 39 lbs., with a daily consumption of 21 English tons of slack, including the fuel required for starting and banking the boiler fires. No fuel economizers are used with the boilers, and the engines are not worked condensing; moreover their average output is not more than half load, so that they work under very unfavorable conditions.

The passenger and parcel receipts per train-mile pan out to 49 cents very nearly, while the proportion of total cost per car-mile comes to 24 cents, or a little less than half. Taken as a whole, the balance sheet shows a steady progress, though slow.

F. B. L.



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EDITORIAL ANNOUNCEMENTS

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The mystery about the New York, Ontario & Western round trip tickets is explained. When the charge was made that Chicago was full of eastward halves of tickets of which the westward parts had never been used, the officers of the Ontario & Western denied that they had been party to such a dishonorable device. As we said at the time, appearances were strong against them. Now it comes out that there really were a good many such tickets in the Chicago scalpers' offices, but that they were counterfeits. We are heartily glad that the officers of the road have been cleared of suspicion in the matter. It was astonishing that gentlemen could have been so disloyal to their agreements as they seemed to have been. The affair is another instance of the many that we have known where the ticket scalpers have given facilities for actual crime. This incident also helps to justify the resolute opposition which some of the railroads made to round-trip, reduced rate tickets for the New York-Chicago World's Fair travel. The strongest argument against them was the facility which they would give for scalping. Instead of serving the public they in many cases give the brokers another chance to make money out of both parties. By the way, we hear no more of one of the favorite arguments for round trip tickets advanced early in the season—that they would relieve the over-worked Chicago ticket offices. Those offices seem to have time and counter room enough for all the business they are called on to do.

The forger has undoubtedly been caught. At least the Ontario people took very prompt and energetic action, and a man has been arrested at St. Louis against whom the evidence is said to be conclusive. This incident affords a good illustration of the security that attaches to ordinary coupon tickets, for the detection of the counterfeits was easy when once they were carefully examined. There were errors in type setting and the wavy blue stripe on the face of the ticket was not the right shade. Quite likely these tickets were made without the use of all the safeguards now known, and it may be that the blunders perpetrated by the counterfeiter in this case would be successfully avoided by him in the next attempt, but what we call attention to is the very small chance that one man—even with a few accomplices—can turn out work equal to that which is done by the combined care and skill of a dozen or more men. This combined vigilance of a number of different persons, each an expert in one particular, is a chief safeguard in the making of paper money, and it is gratifying to think that the same safeguard is available in other fields. It is not alone in steel engraving and other artistic work that mistakes are made. The simple matter of selecting type, and setting it up with the proper abbreviations, punctuation marks, etc., is anything but simple on a long coupon ticket; at any rate one will think so if he attempts to do such a job and have it come out perfect at the first attempt. A ticket forger (unless he takes the buyer into his

confidence) must always calculate to work promptly and hide himself to other scenes; but if this strong likelihood of finding flaws in his work be borne in mind there is a chance to work promptly in detecting him, for a general notice to conductors would stand a chance of being effective.

We spoke last week of the remarkable success of the International Engineering Congress at Chicago. Now it has gone into history; the enthusiasm of the event is over; the agreeable surprise at the large attendance, in spite of the attractions of the Fair, has ceased to be a surprise, and one can look back at the Congress without glamour. Looking back at it so, we can only repeat what we said last week, the Congress was a remarkable event. The papers presented are a real and permanent addition to scientific literature. Of course no one supposes that they were all valuable; indeed, there were many which told nothing new, and a few foolish ones crept in, but the level was remarkably high. The limitations of time and the great number of topics necessarily cut the oral discussion down to pretty rigid limits; but it was generally varied, fresh and sound, and, like the papers, it was actually international. The attendance was quite extraordinary. The Chairman of Division A said that the average attendance in that Division was 125, in spite of the distracting effect of six simultaneous sessions in the allied divisions and of the allurements of the greatest of all world's fairs. We can hardly follow some of the orators of the closing general session in looking on the Congress as epoch-making, and as beginning a brand new set of relations between American and foreign engineers; but that it has much broadened knowledge of each other and deepened respect for each other among the engineers of the nations, there can be no doubt. The division of civil engineering was probably the most largely attended and had the greatest number of papers, but perhaps the most remarkable group of papers presented was in the division of marine and naval engineering. Of the Flying conference we forbear to speak. It was harmless, at least, and probably amused those who went to it.

Perhaps no section of the Congress scored a more marked success at Chicago than that on Engineering Education. The leading engineering schools of America and many foreign ones were well represented, and those in attendance showed an enthusiastic devotion to the work in hand. Papers were read upon many important subjects, and the discussions were of exceptional value. So strongly impressed were those who participated that a permanent organization was effected for carrying on the work. The Society for the promotion of Engineering Education is the direct outcome of this meeting, and the proceedings of this section of the Congress will be published under its auspices. To this society nearly all those engaged in engineering education will soon belong, and probably many others who have an active interest in this subject. The importance of such an organization is patent, and the good results which are likely to flow from it can scarcely now be predicted. Although engineering education has grown to large proportions in this country, yet no common standards of length of course, character of work required, or degrees conferred, have ever been recognized, to say nothing of the relative amount of theoretical and practical work the schools should demand of the students. The question of the minimum plant with which a school should undertake to teach engineering is also a most important one. Of the hundred or more schools in the United States granting the degree of civil engineer, for example, how many of them are provided with the necessary laboratories and appliances, and with the necessary field instruments and instructors to give the student a working knowledge of shop methods, surveying, chemistry, electricity, strength of materials, and the designing of structures? Many of the better engineering schools do all this in a very efficient way, but many more do not have anything like the adequate facilities for such instruction. All the questions concerning engineering education which have been so voluminously discussed in the Engineering Society proceedings of late years can now safely be entrusted to this new society for the promotion of engineering education. It will hold its meetings annually in connection with the American Association for the Advancement of Science, and we hope its fruition may equal its present promises of usefulness. There is now indication that before many years the world will speak of the American Engineering Schools in as high praise as they now do of the American Engineering Practice.

One good job done at the convention of American Society of Civil Engineers last week was the suppression of the code of ethics movement. In one of the business meetings a vote was taken on a resolution to submit to letter ballot the question of the appointment of a committee to consider the matter of drawing up a code for the guidance of the members of the Society in their relations to each other and to their clients. The resolution was lost by a vote of 11 for to 54 against. By the terms of the constitution it could have been carried only by receiving two-thirds of all the votes cast. The defeat of the proposition was, therefore, overwhelming; and it probably settles the matter for a good while. Indeed the debate on the resolution was entirely one-sided; there was not a word spoken in its favor. To be sure those who voted were but a small percentage of the whole body of corporate members; but they must have been fairly representative, and we may conclude that the Society will continue to work along with the ten commandments, the golden rule and the common law.

Another important event of the convention was the report of the committee on standard rail sections; of this we spoke briefly last week. The committee presented a series of sections varying by five pounds, and running up to 100 lbs. per yard. The crown radius is 12 in., the upper corner radius $\frac{1}{8}$ in., the sides of the head straight, the flaring angles 13 deg.; the sides of the web curved on 12-in. radius and the distribution of metal, head 42 per cent., web 21 per cent., flange 37 per cent., or as near those figures as is practicable. The greatest width of head is 2 $\frac{1}{2}$ in. In fact, the general principle governing the design is that which controlled in the designs of Dudley, Hunt and Hawks, and with which our readers must be very familiar by this time. The committee has worked at this problem with much knowledge, care and assiduity for three and a half years and has well earned the vote of thanks that it received. It has rendered a real service to the society, the profession, the railroads and the rail makers. The labors of the committee and the discussion which preceded those labors, and which they in turn have stimulated, have already modified practice. The time spent in evolving a series may seem to have been unnecessarily long, but it has been well spent. The report comes now as the product of deliberation; it is mature, and it is backed by an important body of opinion which has been largely created since the committee began its work. For all of these reasons the report carries more weight now than it could have carried three years ago.

The Block System on Railroads of Light Traffic

In taking exception, lately, to a statement of President Haines, of the American Railway Association, regarding the financial impossibility of running trains by a space-interval system on roads whose trains are most of the time few and far between, we were not unmindful that probably 95 per cent. of the railroad officers who take an active interest in that Association would agree, more or less fully, with the view expressed by their President. And when it comes to the question of what action should be taken in the premises, what should be done to run trains safely where there are no blocking arrangements, and what principles should govern in deciding when to block and when not to block, we have no doubt that we should find ourselves in accord with Colonel Haines on nearly all points; but this is one of the cases in which precision in the statement of theory is almost as important as to aim at right practice.

Assuming that every road, even the poorest, has a telegraph line, block signaling is primarily a matter of methods and not one of apparatus or plant; and any road can use the space interval to some extent. The Tennessee Midland, with no fixed signals, with only a dozen telegraph offices in 200 miles, and only two or three trains a day each way, can maintain a space interval between trains running in the same direction, at least a part of the time, if it so desires. If telegraph operators work only in the daytime, night trains cannot be blocked; if trains must sometimes follow one another within 15 minutes, blocking is impossible at such times where telegraph offices are 25 miles apart; but these conditions do not weaken the general statement that blocking is possible, without undue expense, on that road. If there were a sudden rush of business; if a considerable number of new brakemen had to be employed; if storms or other conditions made extra safeguards desirable, the block system could be put in force at any time, provided only the telegraph operators were properly instructed. It is merely a question whether the operator shall hold

a train 10 minutes—the time interval—or hold it an hour, more or less, until he hears from the preceding train.

It is true that the manager of a road with light traffic may answer that he has not had a collision for five years, that he does not run extra trains oftener than once a year, and that he is not justified in spending a single additional dollar for a safeguard which he claims to be of a wholly theoretical nature; but that does not meet the argument that, with such facilities as he has, his methods should be adapted to the fullest use of such facilities. The ideal way to run trains is to have plenty of block signals, but to see that every train finds every signal at "all clear;" and surely a "thin" road can conform to that ideal much more readily than any one else; the thinner the road, the easier to conform. Practice in blocking when it is thought unnecessary is needful in order to the most effective use of the system when it does become necessary.

A general manager of high reputation recently remarked that it was a crime to run two trains between two stations at the same time. Perhaps he was a little extravagant in his use of terms, but his meaning was that telegraph facilities are so comparatively cheap that not to make use of them is a needless waste. He doubtless had in mind the innumerable instances, occurring daily, where trains follow one another far enough apart so that there are always two telegraph offices between them, and yet the operators do nothing to indicate that fact to the following engineman. Setting such operators at work, and giving the enginemen this valuable information, is just what is done, in a large percentage of the operations, by the station operators on the Chesapeake & Ohio, the Canada Division of the Michigan Central, the Canadian Pacific and various other roads. It is true that the original object of these roads was to protect trains following others closely, but in practice trains are constantly being run with no more disturbance from the block signals than they would be subject to on a similar road operated under the time interval system. And the Chicago, Milwaukee & St. Paul, which finds good results in blocking on its six thousand miles of road, much of which has a very light traffic, certainly relieves us of any necessity of arguing this point from mere theory. Even those who may doubt the wisdom of the St. Paul's course, as regards some of its minor branches, must admit that the training in carrying out blocking regulations will be good education with which to store the men's minds for future responsibilities, when business shall have grown or they shall have been promoted. Such education deserves more attention than it receives.

No road waits until its traffic is heavy enough to warrant the application of the absolute block system to all trains, at all times, before it begins to block at all. The exception of very busy lines, devoted exclusively to passenger traffic, like those leading to the Grand Central Station, New York, does not impair the general accuracy of this statement. It pays to provide the means for blocking as soon as it is practicable to block a portion of the trains, and the essential question is as to what or how large a portion presents conditions which will justify the change. Even the English Government, after all its persistent efforts to establish the most rigid requirements, enacted a law which does not require absolute blocking at all times. The only thing that is positive in the law is the requirement that the *apparatus and facilities* for using the block system shall be provided. *How much* the system should be used at any one point must be decided by each manager for himself. The Board of Trade inspectors have gone to the extent of their powers when they have presented the necessary arguments to such managers as they find using the permissive system where the absolute system is demanded by considerations of safety and warranted by the financial conditions. American managers have no Board of Trade to prod them, but the manager whose road is rich enough to control a telegraph line and two telegraph offices certainly cannot say that he has no facilities for blocking.

The Boston & Albany and the Delaware & Hudson Canal Company run trains with a high degree of safety under the time interval system, and they are not small roads; and their experience is held by some people to justify reliance on that system. But there are two considerations to be borne in mind here. These roads do have a freight collision once in a while. In railroad operation even the protection of human life is a relative question, and financial expediency cannot be ignored; and it is claimed that these freight collisions are so infrequent or do so little harm that they do not afford any basis for an argument. But where business is increasing, and where a very slight collision may make a wreck which will derail a fast

passenger train and kill a score of people, as at Shoemakersville, Pa., in September, 1890, what confidence can one feel if he has to base it on the *probable* infrequency of accidents? With an absolute block system we are at once in a favorable position to aim at making a record which shall show no more freight collisions than passenger collisions.

Secondly, these two roads prescribe and pretty rigidly enforce a uniform low rate of speed for freight trains, and they have more old conductors and brakemen and fewer "tramp" brakemen and green men than most roads of their size; so that conductors who do stretch the rules, and run too fast, succeed in avoiding collisions better than does the average conductor.

Many of the roads which most need the block system are constantly straining their capacity or their facilities. When such roads will enlarge their yards and their equipment so as to run trains at more uniform intervals, and will effectively forbid their men to run at all sorts of speeds (as they run now), they can more reasonably adduce the experience of the two roads named as an argument in their own case. *Progress toward the Boston & Albany standard of discipline* is not a safe thing to count upon, except after a long season of testing.

We are somewhat surprised that Colonel Haines did not mention the block system as a preventive of butting collisions. It is true that on many busy single track roads the dispatchers constantly order—and often must order—trains to meet at places where there is no telegraph office; but this should not prevent the use of the telegraph offices where they do exist. It is also true that on the trainmen and the dispatchers must primarily rest the duty of safely making meeting points; but if operators are charged with the duty of blocking trains running in the same direction, their routine operations are a constant protection against butting collisions also, and this *incidentally*. An operator who has accepted a westbound train will prevent eastbound trains from entering that section, without being told to do so. The Webb & Thompson electric staff apparatus, exhibited at the World's Fair, fulfills the main conditions of an ideal block system for a single track, and its success on roads of considerable importance in New South Wales should lead Americans to investigate its record with care. Most Americans admit, we believe, that the staff system is safer than the American train dispatching system; and after its satisfactory use on long roads, running express trains at forty miles an hour, we must be cautious about claiming that the safety of the staff is secured at the expense of speed and convenience.

Complaining Shippers and Their Treatment in England.

The English Railway Commission is a court with judicial powers. Our readers will remember the bill which was introduced into Congress a year ago to give to the findings of our Interstate Commerce Commission the power of court decisions instead of *prima facie* evidence merely, but which was defeated because an investigating and prosecuting body ought not to be given the full authority of law. Under the act of 1888 these two functions are separated in England. In addition to the judicial Railway Commission, the Board of Trade undertakes to mediate between carriers and traders. Its recommendations have no authority except through public opinion, though by law it must report from time to time to Parliament the results of its proceedings, together with its observations thereon. In this respect the Board of Trade more nearly resembles certain of our State Railroad Commissions which have no final authority.

It is of interest to Americans to note the kind of disputes which the Board has attempted to settle. Its report, mentioned in these columns last week, covers its proceedings from August, 1891, to January, 1893, when the new maximum rate laws went into effect. During this time the Board has dealt with 57 cases. Many of these are of merely local concern, but we epitomize some which are not without interest as general questions.

A meat company complained of rates from London to certain sections as unduly high and "sectionally unequal." The company's reply was that the rates did not compete with each other or with lower rates from other districts; hence no competitive interest was shown. This being admitted the Board declined to go further, since the question now raised was the fixing of rates *per se* and not preferentially. Would that our own Commission had been equally modest in such matters. One trader complained because he had not been granted a special rate for 18 tons—a shipment proportionally quite large in England—where quantity rates on that article were based on two tons; but the Board took no action. Another party complained that prepayment was demanded on fish shipped to him. It turned out, however, that charges were based on the weight of the fish at point of shipment, while complainant was willing to pay only on weight of fish on receipt. Since "the gross weight at sending station" was the rule over all England, the complainant got no redress.

An interesting case involved classification. Blowers were charged for as "blowing engines" because not mentioned in the Clearing House classification, the company refusing to look further. Major Marindin, inspecting officer of the Board, reported that blowers were of considerable weight, easily handled, and were no more blowing engines than a chaff cutter driven by a belt. Finally, the company receded from its position and put blowers two classes lower.

Complaint of a shortage of coal cars brought out the reply, familiar with us, that in summer the traffic exceeded the company's equipment. The result, however, was additional cars and a better supply to the shipper. To show that railroads were not alone complained of, we may cite a case for undue preference against the Grand Junction Canal Company where the Board decided against the canal.

The majority of the cases were of the short-haul order; that is, they involved the rightfulness of a higher charge for a shorter haul. The fact of so many cases of this kind arising in England is of importance to us, because it shows clearly enough that the short-haul section of our Interstate Commerce Act is really unnecessary as a protection to shippers, since the prohibition of undue preference covers the ground completely. This is certainly true in a technical sense, and we are not sure but that it is unqualifiedly true. The effect of our short-haul clause has been to put the burden of proof on the railroads, to show that a higher charge for a shorter distance is justifiable, and while this is doubtless right, if the matter were thoroughly under control, it has in some cases led to the abolition of low competitive rates which might fairly have been left undisturbed. We mean that in 1887, and since, there have been revisions of tariffs for the purpose of effecting a general compliance with the letter of the fourth section of the Interstate Commerce Law, which justice and equity did not demand; the roads raised rates out of respect for the short-haul sentiment, in cases where the sentiment did not deserve respect.

Under the English law of undue preference some of the short-haul cases were decided against the complainants, but mostly the disparities in rates were ordered modified. Lancashire cotton yarn was carried to Glasgow at 22s. 6d. per ton, while the rate to a local station 23 miles nearer the starting point was 25s. The Clearing House conceded the Glasgow rate to the local station. Cases of lower charge for longer distance because of water competition were dropped.

An important complaint was to the effect that coal was carried to London at 1s. per ton less than to local towns from 8 to 15 miles nearer the mines; and also that other local places were better treated. The answer alleged possible sea competition and a difference in cost of working the large quantities of coal consigned to London as compared with the small tonnage consigned to the complaining towns. The Board declined to recommend any reduction in view of the maximum tariffs then before Parliament. The Board, however, informed complainants that their complaints appeared to relate to general inequality of charge, the only remedy for which was equal mileage rates, a principle condemned by Parliament; also that rates which were fair and reasonable in themselves were not to be condemned by comparison with other rates with which they had no real concern. Evidently the English law of undue preference (which is in our act as well) gives more regard to the intrinsic justice of short-haul charges than our own famous section prohibiting the higher charge for a shorter distance in all cases regardless of circumstances. Allowing the Interstate Commission to permit exceptions has not thus far answered the objection, because the commissioners feel themselves, and very properly, bound to enforce the plain sense of the act whenever possible. If that entire section were to be struck from our law its usefulness would probably not be impaired. There would at once be a large increase in complaints—if all the shippers who felt aggrieved were to enter their complaints—but as the Commission is incapable, by reason of the largeness of the country and the "delays of the law," of righting the present volume of wrongs it is not certain that an increase of volume would make things any worse. It might better them, by inducing more rational and prompt treatment of complaining shippers by the railroads themselves.

The Shrinkage of Railroad Business.

Reports of retrenchments on railroads have now become so numerous and are characterized by such sameness that in giving one of them we give the substance of all. Practically all of the large roads of the country are reducing forces in every department where a man can be spared, or are reducing the hours where it is possible to adopt that expedient and thus retain faithful employees; and new work is being curtailed practically everywhere. Repair work is also largely reduced. We note some of the principal items gathered from press dispatches.

The Maine Central, which is reducing expenses generally, has taken off a passenger train between Portland and the White Mountains. The New York, New Haven & Hartford, which ought to be one of the last to feel the depression, has taken off several work trains. The New York & New England has discharged section men and shop men, probably 200 or more in all. The foregoing are the only items of consequence that we

have seen from New England. The New York Central has reduced the time in all its shops three hours a day and President Depew tells a reporter that four through passenger trains will be taken off. These are: The Chicago limited (10 a. m.) over the Michigan Central, the World's Fair special (noon) running over the Lake Shore, the Southwestern express leaving New York at 8 p. m., and a Boston special from Albany; with the corresponding eastward trains. The Pennsylvania instituted a general retrenchment some weeks ago and has now reduced the time in the shops to five days of nine hours each, per week. Besides this, some men have been discharged from the shops. The Reading shops and those of the Lehigh Valley have received orders practically the same as on the Pennsylvania. The Baltimore & Ohio discharged shop hands some time ago and is still curtailing shop work.

A Toledo dispatch of Aug. 7 says that the Lake Shore has laid off 1,000 men on the divisions centering in that city. The Louisville & Nashville has made a reduction of 20 per cent. in salaries over \$4,000 a year and 10 per cent. on those over \$600 a year, and those between \$540 and \$600 are reduced to \$540. The shops run five days in a week. The Wabash runs its shops six days, but only eight hours a day. It is said that the Burlington will take off one of its three through trains between Chicago and Denver. On the Chicago, Milwaukee & St. Paul all employees in the "Commercial Department," whatever that may mean, will be reduced 10 per cent., except those who get \$50 a month or less. This road, like all the others, has reduced construction forces wherever possible. The Evansville & Terre Haute has reduced trainmen, except engineers, 10 per cent. A press dispatch says that "the men object to the reduction, though they are willing to lend the company 10 per cent. of their wages."

The Richmond & Danville shops at Atlanta have been put upon five hours a day. The Central of Georgia is to take off one train between Savannah and Atlanta. It was said that the "Nancy Hanks" train would be the sufferer, but it appears that this train is still to be run at high speed, though it will make a good many more stops, thus lengthening its time. The Missouri, Kansas & Texas is making a general reduction, and the Union Pacific retrenchment is felt in Texas as well as on other parts of the system. Several passenger trains will be taken off this road in Colorado, and there will be only one through train over the Oregon Short Line. The stagnation in silver mining caused severe reductions in Colorado several weeks ago, but it appears that it is only recently that the railroads have decided to notify the engineers that the reduction would affect them (at the end of the 30 days' notice stipulated in the agreement between the companies and the men). It is reported that some of the men in the shops of the Peoria, Decatur & Evansville, at Mattoon, Ill., struck against a 10 per cent. reduction of wages, and on the Toledo & Ohio Central it is said that the firemen have received a slight increase in pay. It is said that the number of men discharged on the Pacific system of the Southern Pacific is 1,000 and the shops have been put upon eight hours a day. Several train dispatching offices have been abolished and a good many operators have been discharged. The daily passenger train mileage has been reduced 1,500 miles.

A Detroit dispatch says that the Michigan Peninsular Car Co. has laid off 1,500 men. The Union Switch & Signal Co. has laid off 150. It was reported that the Baldwin Locomotive Works had suspended a large number of men, but the officers of the company say that no definite action has been taken except to discontinue engaging new men. This has the effect of reducing the force, as there are from 100 to 200 deaths, discharges or resignations every week, in ordinary times.

Among the other news items incident to the "depression" is one from San Francisco stating that the Southern Pacific has issued orders not to run freight trains unless with full loads; and some of the roads between the Missouri River and Chicago are taking somewhat similar action; that is, they are "letting up" a little on fast time, thereby enabling the engines to haul more cars. It has often been remarked that competition in the United States was slowly assuming the form familiar in England—a rivalry of facilities rather than of rates. Certain it is that of late years trains on roads both east and west have been run with light loads under the stress of competition. The order of the Southern Pacific probably means the practical abandonment of a good many "time" trains. In these days of storm and stress such a measure, if enforced, would work in the interest of good economy. No doubt, too, a good many roads will try to do the same thing, though without public notice of the stoppage of fast freight trains. It is not probable that either trainmen or large shippers will fall easily into the new order; and, indeed, there must be discretion lodged somewhere as to modifications of the new rule; yet on the whole, during the falling off in tonnage and earnings, the plan of concentrating freight and saving train-mileage offers a possibility of saving expenses which many superintendents will be glad to avail themselves of.

Another item a little out of the usual run is the report of a notice of reduction issued by the Denver & Rio Grande to the enginemen and firemen. This notice takes effect only at the end of 30 days, that

period being stipulated by the agreement between the company and the men. A similar report from Salt Lake states that the men on the Rio Grande Western, including the brakemen as well as the enginemen and firemen, receive sixty days' notice. As other employees have to submit to reductions without much notice, this advantage which the brotherhoods have secured by union will be held up as one more justification for the existence of such brotherhoods. The mere fact that enginemen get better pay than conductors has been pointed to as equal to "tons of argument" in favor of unionism, and such a conclusion is by no means without rational basis. This fact of an enforced delay in reducing wages will probably have its effect in the future, simply as a sentimental landmark, without regard to whether its actual result now shall be good or ill; but that it is not sure to turn out in all respects as the men might expect is indicated by two significant clauses in the news item referred to: (1) That the company will not take advantage of its notice if business should improve so as to make a reduction unnecessary, and (2) that the men may waive their privilege of a notice. These utterances are highly creditable if they were made, as reported, and we hope the report is true. If a railroad company is honestly and fairly managed, it is in order for its employees to remember the fundamental principle that the interests of employer and employee are in large degree identical, and that this principle applies with peculiar force when retrenchment becomes the order of the day; and when all other employees have to submit to a necessary reduction of pay, the enginemen and firemen would of course feel ashamed to continue drawing the old rates.

The shrinkage in railroad earnings has become phenomenal, and it still continues. Generally, the decrease in freight tonnage goes through all classes of commodities; freight is not moving simply because people cannot buy things. With many, if not with most of the railroads, passenger earnings are below the normal in spite of the World's Fair, and this is true of roads running directly into Chicago. People are staying at home because they feel too poor to travel. Of course this state of things is affecting the World's Fair very seriously indeed. How long it will last is a matter of opinion, and no one's opinion can be worth much. It will depend mostly on his mental habit, but many wise men believe that matters will be worse before they are better. Thrashing is now in progress, and the grain-carrying roads are hoping for good business soon. The wheat crop is apparently a fair one. The wheat is spotted, and in some regions is very short, but the average seems to be good. The corn crop promises to be above the average, but it is still early to judge of it very accurately.

TRADE CATALOGUES.

Pittsburgh Locomotive Works.—The dozen locomotives exhibited by these works at the World's Fair are described in a substantial cloth-bound book containing the principal dimensions of the engines, with full-page direct process illustrations.

Cranes and Railway Appliances is the title of a large and comprehensive handbook issued by the Industrial Works, of Bay City, Mich., describing the well known cranes, derricks, steam shovels, pile drivers, transfer tables and rail saws made by this concern. There is a large number of full page illustrations and also some detail drawings. The list of roads using the company's machines is very full.

The Fontaine Crossing and Electrical Company. Detroit, Mich., manufacturers of dynamos and motors, large and small, have issued their descriptive catalogue and price list for 1893, with several pages of letters and references. The company manufacture their machines upon the principle that the "best is the cheapest," and invite investigation. The catalogue is well illustrated, and contains some good suggestions to purchasers as to what features a good machine should possess.

Our Exhibit is the title of the Brown & Sharpe Manufacturing Co.'s pamphlet describing what they show at the World's Fair, and the plan of the work is one of the very best we have seen. It contains only 16 pages and the type is large and clear, but one gets just such a comprehensive idea of what is to be seen as he wants on such an occasion. A larger work would be thrown aside unread. The display of machines is very extensive, milling machines being the most prominent. Five of these are of new design, never before shown. The display of tools made by the company includes more than 15,000 different articles. The pamphlet contains illustrations of the most interesting machines, a history of the works and a diagram of the exhibit.

Light Cars is the title of a handsome catalogue just issued by the Sheffield Car Co., of Three Rivers, Mich., the well known makers of velocipede cars. The word "velocipede" comes naturally to one's mind whenever he thinks of this establishment as that is the kind of car in which this concern was a pioneer; but the present catalogue, consisting of about 100 pages, is a pleasant reminder that the business has very greatly outgrown the modest beginning of 14 years ago. The present work is illustrated by a number of handsome lithographs as well as by full page cuts showing every description of car made at the shops. Among these are hand-cars of

all kinds, logging cars, small dump cars, plantation cars and electric motor trucks. There are also hand cars with a mowing machine attachment, for cutting weeds, and a special velocipede for use in mines. The shops of this company are now so large and complete that its resources are equal to any demand.

Chicago Traffic Matters.

Freight Traffic.—Despite complaints of dullness in the freight departments of the leading Western railways centering in Chicago from the interior, their reports to the Board of Trade show a volume of grain and miscellaneous traffic that compares well with last year. The deliveries of grain by 11 roads the past week aggregated 4,182,000 bush., against 4,337,000 bush. for the closing week last month, and 4,163,000 bush. for the first week in August, 1892. There was no change in the aggregate volume of other freight.

The receipts of flour and grain at Chicago by 11 Western railroads for the past week, and same time in 1892, were as follows:

By—	1893.		1892.	
	Flour.	Grain.	Flour.	Grain.
Chicago No. West.....	Bbls. 11,295	Bush. 447,000	Bbls. 13,468	Bush. 565,000
Ill. Cent.....	1,500	775,000	325,000
C. & N. W.....	7,400	449,000	2,375	544,000
C. & B. & Q.....	15,376	1,243,000	13,955	930,000
C. & Alton.....	2,100	149,000	6,550	275,000
C. & E. Ill.....	300	272,000	150	201,000
C. & M. & St. P.....	18,600	344,000	19,355	476,000
Wabash.....	450	160,000	1,775	186,000
C. & G. W.....	10,610	114,000	14,652	213,000
A. T. & S. Fe.....	600	229,000	315	417,000
Wis. Cent.....	904	300	11,000
Totals.....	69,335	4,182,000	72,895	4,163,000

The following shows the number of carloads of grain received at Chicago for four years:

	1893.	1892.	1891.	1890.
C. & B. & Q.....	Cars. 3,076	Cars. 4,108	Cars. 4,384	Cars. 4,077
C. & N. W.....	2,408	2,230	3,069	4,400
C. & A.....	1,217	1,234	2,989	1,257
Ill. Cent.....	4,171	3,431	5,301	1,835
C. & N. W.....	2,646	2,333	2,267	1,925
Wabash.....	1,378	1,081	2,776	668
C. & E. Ill.....	611	791	2,583	133
C. & M. & St. P.....	2,304	2,183	1,517	2,749
G. West.....	725	1,429	370	29
A. T. & S. Fe.....	835	2,124	1,591	1,334
Wis. Cent.....	2	13	7	1,212
Special Trk.....	745	2,697	1,816	1,520
Totals.....	21,048	23,555	28,874	21,148

Though the number of cars received last month was smaller than in either of the three preceding years they brought more grain. For example, 21,048 cars this year contained 17,096,000 bushels of grain, against 16,228,080 bushels in 23,555 cars in July last year, and 14,191,000 in 28,874 cars the same month in 1891. Interior shippers are required to observe regularity in loading. Each car is loaded with due regard to its carrying capacity.

The receipts of live stock at Chicago by 11 leading Western railroads for July, 1892 and 1893, also for the first seven months of 1892 and 1893, compare as follows:

	July, 1893.	July, 1892.	Seven months, 1893.	Seven months, 1892.
A. T. & S. Fe.....	2,111	2,098	7,432	7,011
Chi., Burl. & Quincy.....	5,097	5,501	33,583	39,883
Chi., R. I. & Pac.....	3,060	2,429	17,566	20,413
Chicago & Alton.....	3,019	2,777	14,253	12,237
Chicago & N. West.....	2,803	2,779	20,081	35,229
Chicago & E. Ill.....	480	501	2,535	2,504
C. & M. & St. Paul.....	1,700	2,365	20,135	24,706
C. & Great West.....	418	449	5,223	5,623
Illinois Central.....	1,515	1,527	11,793	15,675
Wabash.....	1,144	2,039	11,273	8,882
Wisconsin Central.....	342	149	342	808
Totals.....	21,689	22,814	144,286	173,041

The shipments last month included 6,237 carloads, of which the Lake Shore carried 1,944 cars; the Grand Trunk, 1,052; Pittsburgh, Fort Wayne & Chicago, 905 and Michigan Central, 564.

Coal Traffic.—The statements in the railroad department of a morning paper that the roads are likely to have a largely increased coal tonnage the coming autumn and winter seem unwarranted by the facts. With scarcely an exception the movement of coal the closing months of 1892, and January and February the current year, employed all the cars the roads had, and there is nothing in the present situation of the coal trade to justify the opinion that a large increase is likely to occur during the period above indicated, the only exception among the Western lines being the Atchison, Topeka & Santa Fe, which is opening extensive coal deposits on its Illinois division. The officials of the road state that the extent of the deposits, and cheapness with which the coal can be placed on the market, promise to render the mines a profitable source of revenue to the company.

Passenger Traffic.—The passenger traffic of the roads west of here has not improved. General Manager Earling, of the Chicago, Milwaukee & St. Paul, when asked if his passenger business had met anticipations since rates were reduced, replied that it had not. He attributed the failure to the disturbed condition of finan-

cial affairs, and small prices realized for farm products, coupled with the depression in the industrial interests. It is predicted, however, in some quarters, that September and October will bring a material increase in the number of visitors from the Northwest, which has so far been indifferently represented.

Impressions of the World's Fair.

In the gallery of the Transportation Building is a magnificent exhibit, sent by Martin Schenck, State Engineer of New York—a relief map of the Erie and lateral canals. This is the finest relief map in the whole Exposition, and that is high praise. Looking at this, one can appreciate the great skill of the engineers who were able to locate the Erie Canal, so as to carry water from Lake Erie to the Hudson with no summit, and with no very great earthworks or aqueducts. It is a lesson to be studied. One can also see from this relief map that the easiest way to make a ship canal connecting these waters is to descend into Ontario, and come back to the Mohawk by way of Oswego. The United States Government Engineers exhibit some fine relief maps and models, notably those of the Mississippi improvements. The Baltimore & Ohio exhibit of the evolution of the locomotive interests everybody. Another most interesting exhibit, in the gallery of the Transportation Building, is Stevens' twin-screw steamboat, antedating even Fulton by eight years. Near it is the modern Hoboken ferryboat with its screw at each end. A very little change would convert this into the best possible hart or defense ram. Were this system worked out to perfection, the whole of the wonderful exhibit of Krupp—guns, armor-plates and all—might be used for scrap.

A fine model of the unhappy battleship "Victoria" shows why a small hole in her side would make her capsize and go to the bottom. The phrase "top-heavy" describes it all.

The United States Naval Exhibit, consisting of the imitation war ship "Illinois," and the models of the whole new navy on her berth deck, is one of the most interesting and instructive exhibits. A touch of a rock, the blow of a ram or possibly of a torpedo would greatly imperil their safety. The brick ship "Illinois," resting on piles, is the only unsinkable ship we have.

If the movable sidewalk, instead of being away from everything, out on the pier, had been placed on the Midway Plaisance, it would have been a great success and relieved many tired feet. The means of getting to the grounds are perfect; but those of getting about in the grounds could be improved. The rolling chairs and electric launches cost too much for the bulk of the visitors to pay. The distances are great. The Liberal Arts Building is about a quarter of a mile from the nearest Intramural Station. Wagonettes taking people from building to building for a low fare would be a great improvement. This is the only thing I can criticize. The management of the Fair is wonderfully good.

Since I have learned, with much surprise, that there are 420 miles of passages in the buildings, and 440 on separate exhibits, my desire to describe them has weakened and this will be my last letter. I can only say that from the youngest exhibit—a coin or medal just turned out in the United States Building—to the oldest, a piece of a Roman corduroy road 1,888 years old, in the Transportation Building—all are interesting, and I would advise any one, if he has only \$50 in the world, to come and see this fair, before it is too late.

July 29, 1893.

T. C. CLARKE.

Engineering Congress Papers.*

An Account of the Building of Leixoes Harbor, by Alfonso J. N. Soares, is a description of the construction of a seawall surrounding the harbor, which is situated five kilometers north of the mouth of River Douro, between Spain and Portugal.

The construction was by the so-called mixed system. The submarine structure was a mound of loose stones of three assorted sizes, so placed that the largest occupy the positions most exposed to the action of the waves. The seaward slope of this submarine embankment is faced and defended by artificial concrete blocks 20 cubic meters (26 cu. yds.) each in bulk, and weighing 45,000 kilograms, more or less. These blocks extend about 5 meters (16.5 ft.) above datum (extreme low water), and to a depth of 7 meters (23 ft.) below. The breadth of the mound at datum is 38.24 meters (125.5 ft.), and the blocks occupy the width of 15.8 meters (51 ft.) between the seaward slope and the sheltering wall. The superstructure is 5.4 meters (17.5 ft.) thick at datum and has a height of 9.8 meters (31.9 ft.), with a batter of 1 horizontal to 10 vertical. The parapet is 1.4 meters (4.6 ft.) high which makes the total elevation of the upper structure above extreme low water 11.2 meters (36.5 ft.), or 7.4 meters (24 ft.) above the highest tide. The slope of the rubble on the harbor side is 1.33 horizontal to 1 vertical, and that of the blocks on the outside 1 to 1 to a depth of 7 meters (23 ft.), where it terminates, being followed by the largest of the three sizes of rubble, with increasing breadth.

The construction of the heads of breakwaters followed what is called the upright system. After the sand and detritus were removed to rock bottom the foundations were formed with bags of concrete. One is sunk to a depth of 15 meters (50 ft.), 2.7 meters (8.8 ft.) being in the sand,

and the other rests upon a rock 10 metres (33 ft.) below surface of low water. In both of these heads the rectangular part is 15.4 meters (50 ft.) thick, and the circular part 20 meters (66 ft.) in diameter. The rectangular parts and the north head were all built of concrete blocks 16.5 to 20 cubic meters (21 to 26 cu. yds.) in bulk, which were placed in horizontal courses and layers, without mortar in joints or beds. The circular part of the south head was built within an iron caisson that was lined with rubble stone bedded in mortar and filled in with concrete. Above the quay plane the upper structure or sheltering walls agree with those on the mounds.

The construction was carried on with four cranes—two large ones (Titans) and two steam cranes of about 20,000 kilograms power—two steam screw-jack wains of 60,000 kilograms in the stoneyards to move the heavy blocks, and 25 cranes from 15,000 to 18,000 kilograms power at the quarries and stoneyards. There were also seven locomotives besides hoisting and portable engines about the works. The floating plant consisted of two large steam hopper barges to convey and deposit the assorted rubble, and to carry large blocks, and several dredging boats and a tug.

The entire work was taken by contract at a lump sum of 4,500,000 mille reis, work to be begun in six months and finished in eight years, which was practically accomplished. The author considers the performance unequalled in so short a time in a sea so much exposed to the winds of such an extensive area. The progress of the work was very satisfactory, and, barring a few accidents the work was completed, without great misfortunes. Experience during construction and since completion has convinced the engineer that the system of construction designed was appropriate to the conditions existing, notwithstanding the ill omens of respectable engineers to the contrary, both before and during the progress of the work. The quantities of materials employed upon the breakwater were as follows:

608,836 cubic meters (791,486 cu. yds.) of assorted loose rubble.
125,480 cubic meters (163,124 cu. yds.) of artificial blocks.
3,252 cubic meters (4,227 cu. yds.) of concrete in bags in caisson.
131,274 cubic meters (170,656 cu. yds.) of hewn and rubble masonry and artificial blocks in the sheltering walls.
18,400 cubic meters (23,920 cu. yds.) of rubble masonry in quays.

Mr. F. A. Pimental's paper on *Common Roads, Railways and River Communications in Portugal*, contains some interesting statistics of the traffic, mileage and new construction of railroads in the kingdom. The author gives the total length of railroads in operation in 1891 as 2,284 km., of which 2,089 km. is broad gauge (5 ft. 6 in.) and 195 km. narrow gauge (3 ft.), and the length of broad gauge lines under construction as 177 km. Of these roads 1,468 km. is operated and managed by companies, and 816 km. by the state.

With an area of 89,143 sq. km. (33,163 sq. miles) this gives an average of .043 miles per square mile of territory. All the roads are single track, except a few miles from Lisbon to Cacem and between Lisbon and the Entroncamento at Collega.

The paper gives a brief description of each line, a table showing the total length of its tangents and of its curves, a record of the grades and the freight and passenger traffic it carries. There is a brief report of the length of navigable streams of Portugal and the maritime trade which she carried on in 1851 and 1890.

Supt. F. C. Mendenhall's subject of *Fundamental Units of Measure* is not a new one between him and the engineering profession. Mr. Mendenhall goes to the root of surveying by starting at the initial point, the standard of units. He evidently does not mean to let this subject rest until he has secured the universal adoption of the French standard of units, the metric system, first in the engineering profession, and later in all professions and trades, and he has done much to educate the people to this end. After a discussion of the need of a standard of weights and measures that shall be universal for all places and all time, he then shows that the metric system is the most perfect ever used by man. That although it is susceptible of improvement in one or two matters of minor importance, yet it is in use by the great majority of civilized nations. He then presents the origin and present condition of what is characterized as the brain-wearying, intellect-destroying system of weights and measures in use among English-speaking people. It is the old story of a barley-corn, round and dry, 12 of which made a foot, and of a square brass rod with oblique ends, that was the standard yard, the parent of our present unit of measure. A comparison of the British and American standards of weights and measures is made, and their differences shown. He publishes a fact which may not be generally known, viz., that Congress in 1866 legalized the metric system of weights and measures throughout the United States, and that it is the only system whose use is made legal throughout the whole country by act of Congress. The paper gives in full a recent bulletin (April 5, 1893), issued by the Treasury Department, announcing that in the future the Office of Weights and Measures will regard the meter and kilogram as the fundamental units, and that the yard and pound will be derived therefrom, in accordance with the act of Congress of 1866.

Mr. Clarence M. Barber's paper upon *Carbon and Its Uses in Electrical Engineering*, contains the surprising information that 200,000,000 carbon pencils are required per year to supply the electric lamps of the United States, and that there is invested in this country over \$1,500,000 in the manufacture of carbons for electrical purposes. He describes in a general way the two processes of manufacture of carbon pencils, brushes, crucibles, etc., by molding and by forcing. He brings to light some of the fine points of manufacture of superior pencils and brushes, but does not betray the secrets of the trade. The paper is one that will be of interest to consumers and dealers in carbons for electrical apparatus.

Mr. H. D. Haskold's *Historical Notes Upon Ancient and Modern Surveys and Surveying Instruments* go back to the times of the ancient Chaldeans and to the days of Thales, Pythagoras, Archimedes and Ptolemy. He mentions historical references, records and maps as far back as 1825 B. C. in Arabia, and 1700 and 1400 B. C. in Egypt. From Euclid of Greece (300 B. C.), to Vitruvius of Rome (20 A. D.), to Ferrel of France (1525), to Diggs of Britain (1550), he follows the history of land measurement and surveying. He makes Diggs in 1550 an author of a work on "Surveying," in which a compass or circumferenter is described 2 ft. in diameter placed upon a staff and which is termed a *theodolite*. The author has given the ancient units of distance employed and their value in modern standards. He has followed the improvements in instruments and has mentioned the surveying expeditions and triangulation in the chronological order they have been undertaken. Not till after Newton (1642-1727) had developed the theory of mathematics and Ramsden invented his dividing engine (1750), did surveying reach what might be called an exact science; but between that date and 1800, surveying may be said to have been strongly in the ascendant. The present system was developed during that period.

A flattering tribute is paid by the author, an official of the Government of the Argentine Republic, to the United States Coast and Geodetic Survey for the improvement and application of geodetic details to surveying. He also reviews briefly the geodetic survey of India by the English, and that of the gap between Lapland and Russia by the Swedes and Russians, as well as those of the French and German governments.

The paper is concluded by a brief description of some new surveying instruments and some methods employed by the author in mine surveying. The work is valuable for historical reference.

Foundations Under Water by Forcing Cement Into Loose Sand or Gravel by Means of Air Pressure; a paper prepared by Fr. Neukirch, explains one of the very ingenious ways adopted by engineers to evade expensive and dangerous work. The process is one by which the sand and gravel of a river or sea bottom are converted into a concrete masonry foundation without being excavated or even disturbed. This is done by using air pressure to force dry powdered hydraulic cement through a pipe down into the bed of sand or gravel. The pipe or tube has a lance-shaped foot perforated with small holes through which air is forced. The pipe is sunk deep into the sand and gravel bed by forcing air through these holes, which displaces the particles of sand at its foot and allows it to settle. When the tube has reached a solid substratum the cement is fed into the tube, and the current of air carries it to the foot of the tube, and injects it with considerable pressure into the sand and forms a matrix with the sand, gravel and water present. The blowing in of the cement and air in this mobile mixture produces a boiling action at the end of the tube which thoroughly mixes the cement and sand. As the process goes on and the introduction of the cement continues, the tube is slowly drawn up at a speed that permits the required quantity of cement to be introduced. As the tube is drawn up and the injection of the air ceases, the grains of sand subside and settle firmly together, occupying a smaller space than before the cement was introduced. The paper gives instances where beds of sand, after having one-fifth of their volume of cement injected into them occupied less space than before. Each sinking of the tube gives, of course, only a column of concrete, its size depending upon the pressure of the air and the looseness of the sand. To insure the solidity of the whole foundation, the pit is divided into small fields from 8 to 12 in. square, and into each field the pipe is sunk and the requisite quantity of cement forced. The correct amount of cement is determined by multiplying the cubic yards of the foundation by the ratio of cement advised. To avoid moisture and the consequent clogging of the cocks and nozzles with cement, the air should be warm and the cement perfectly dry. The air is warmed by forcing it through a heated chamber.

The entire process being carried on by machinery, it may be executed rapidly and with little manual labor.

If it is required to transmit the load of the foundation to a substratum below that upon which the sand bed lies, it can be done by driving piles through the sand to the substratum and then connecting the sand together about the piles in the same manner as before. To limit sharply the lateral dimensions of the foundations and to protect it against outside influences, it is in the first instance surrounded with sheath piling or a cofferdam.

The paper describes briefly several pieces of work that have been built and repaired by the process.

*Abstracts of papers read before the International Engineering Congress at Chicago July 31-Aug. 5, 1893. Division A, Civil Engineering.

Mr. Charles A. Schott's article on *Terrestrial Magnetism in North America* has no special interest for railroad men. It discusses the magnetic needle and its variations, local, secular, diurnal, solar, lunar. The author hopes for another Arctic expedition and a complete magnetic survey of the region surrounding the pole. He fails entirely to discuss the theories of magnetism, or to clear up the question whether the earth's polarity is due to electrical conditions. He makes a brief reference to the effect of the sun-spot phenomena and to disturbances accompanying auroral lights and strong earth currents. These are the only reference to electrical causes of polarity. The paper furnishes little that has not been published before.

Mr. Berthold Stahl's paper on a *Method to Secure the Stability of a Quay Wall* explains how the cause of a landslide was remedied and the destruction of docks averted. The quay wall was built without providing proper drainage and the surface material, which rested upon a substratum of clay, slid down against the wall when the clay became soaked and slippery. This is a frequent consequence of the neglect to provide drainage for retaining walls.

The wall having been built upon a platform foundation resting upon piles the writer first sought to secure this pile foundation. This he accomplished by running long tie-rods to heavy timbers anchored some distance in shore in the substratum of clay. The rods were provided with nuts or turn buckles so that they could be tightened and made taut. To insure good drainage and remove the cause of the slide by keeping the clay substratum dry and stiff, the ditches containing these tie-rods were filled in with stone and holes were made in the wall and platform. The space inside of the wall was excavated and also filled in with broken brick. The quay wall was relieved from further lateral pressure by building a beton wall behind it to take up the whole pressure of the upper backing soil and transmit it to the piles as low as possible. Pipes were cemented into this wall to insure the escape of the water. The repairs seem to have been successful, and the paper affords a striking example of a failure due to lack of drainage in the presence of clay.

American Grain Elevators, by E. Lee Heidenreich, is a brief description of the several types of modern grain elevators, including storage, transfer, cleaning and terminal elevators. The writer describes the general methods of construction and gives several plates to illustrate the text. The final paragraphs of the paper present a digest of the main features of the paper, and suggest the improvement to be sought in elevator construction. The author says:

The principal requirements of a grain elevator, namely strength, tightness, light, and effective and accessible machinery, are such as to invite the attention of engineers; and before closing the writer wishes to say that the handling and storing of grain, both in the interior and at the lake and ocean terminals, presents a wide field for future discovery and improvements. Some of the immediate wants are: larger capacity cleaning machinery, adequate drying apparatus, automatic weighing machinery, fireproof bin construction, and pneumatic unloading of cars or vessels with a view of greater capacity per hour than can be obtained at present. And last, but not least, a general use of electricity for driving isolated parts of machinery, or, perhaps, for transmitting power to every piece of machinery in the entire elevator.

The main principles which must be kept in view while making these improvements are rapidity and economy of construction, and a reduction of the labor employed in the handling of grain in American grain elevators of the future.

Foreign Railroad Notes.

One of the Russian railroads is shortly to be equipped with a rotary snow plow essentially the same in design as some of those which have come into such extensive use in this country during the past 10 years. It is being built by Messrs. Baumeister & Wain, of Copenhagen, Denmark, and is to be capable of developing 300 H. P.

The shops of the Hungarian State Railroads recently turned out their 500th locomotive, and celebrated the event with considerable display, 2,000 workmen in their Sunday clothes turning out to receive prominent men and to hear a speech from the Minister of Commerce, who is the responsible chief of the State Railroad system.

Some idea of the extent of the sleeping car service on the continent of Europe may be formed from the fact that the International Sleeping Car Company, which provides most of the cars—perhaps a larger proportion of the whole than the Pullman company in this country—had \$1,092,000 of gross earnings last year. Its profits sufficed for a five-per-cent. dividend, amounting to \$120,000.

TECHNICAL.

Manufacturing and Business.

The Jackson & Woodin Manufacturing Co., Berwick, Pa., have just completed a new car wheel plant supplied with the Whiting system of cupolas by the Detroit Foundry Equipment Co., of Detroit, Mich.

The following companies have been chartered in Illinois: The McArthur Bros. Co., of Chicago; capital stock, \$250,000; to construct railroads, canals, sewers, and buildings; incorporators, Henry W. Magee, George E. Wissler and Arthur F. McArthur. The William Goldie & Sons Co., Chicago; capital stock, \$40,000; to

construct buildings and bridges; incorporators, Henry W. Magee, George E. Wissler and William Goldie, Jr.

The South Milwaukee Malleable Iron Co., of South Milwaukee, Wis., has suffered a loss through the partial burning of its plant. The new works of the Bucyrus Steam Shovel & Dredge Company, adjoining the burned works, were in great danger, but were saved.

The Department of Railways and Canals, Ottawa, has awarded a contract to the Central Bridge Works, Peterborough, Ont., which amounts to nearly \$50,000, for the construction of 1,300 lin. ft. of steel pipe, with angle plates and flanges in connection with the Sault Ste. Marie Canal.

The Heath Rail Joint Co. is contemplating removing its manufacturing plant from West Superior to Pittsburgh. The company was manufacturing rail joints at the works of the West Superior Iron & Steel Co. When that company suspended it was decided to move their machinery to a more central manufacturing point, and the company has about settled upon Pittsburgh as its objective point.

This joint is now in use on 52 railroads and the company recently completed an order for five miles of its improved pressed steel joints for the St. Paul & Duluth.

Articles of incorporation have been filed at Albany, N. Y., for the Extension Car Shop Co. The capitalization of the corporation is \$100,000. The officers are: President, C. W. Hackett; Vice-President, A. C. Salisbury; Secretary and Treasurer, I. J. Griffiths.

A number of residents of Elmira, N. Y., including District Attorney Charles H. Knipp and Wm. R. Compton, have organized a stock company for the purpose of manufacturing the O'Dell railroad switch. The switch is the invention of A. P. O'Dell, of Bradford, Pa.

The Bothwell Compressed Air Improvement & Construction Co. has been formed under the laws of the State of New York, with offices in Vanderbilt Buildings, New York City.

The company will engage in the manufacture under its patent of air-brakes, steering apparatus and other devices in which compressed air is used. The directors and officers of the company are as follows: W. T. Bothwell, Jersey City, N. J., President; Geo. W. Waite, Jersey City, Vice-President; Fremont Wilson, New York, Secretary and Treasurer; Jas. R. Naylor, Brooklyn, N. Y., General Manager; A. R. Bolus, Jersey City, Chief Engineer, and J. W. Rosencrans, Brooklyn, N. Y., Superintendent of Construction.

The Bloomsburg Car Co. is building 100 sectional frame houses, 16 x 18 ft., to be shipped to South America.

Iron and Steel.

The Bessemer steel works of the Colorado Fuel & Iron Co. will start up Aug. 15, having a month's orders for rails. By that time the company hopes to get other orders. The merchant bar mills are closed for lack of orders.

The Carpenter Steel Co., of Reading, Pa., announce that by reason of new contracts it will put in operation 12 new crucible furnaces this week and give employment to many new hands.

New Stations and Shops.

The Oswego Railway Spring Co.'s works, at Oswego, N. Y., are being enlarged by the addition of a new building, 125 x 75 ft. in size. The new building will be devoted to the manufacture of elliptical springs for locomotives, passenger and street cars, and when this department is completed and in use, about Aug. 20, the entire plant will have a capacity of about 30 tons of springs a day.

Work on the buildings for the Great Northern shops, at Spokane, Wash., is practically completed. The round-house is also complete. It will take six months to fit out the repair shops with machinery, work on which will be begun within a short time. The building contractors were Ashenfelter & McKenzie.

The Berlin Iron Bridge Co., of East Berlin, Conn., has received the contract for the new power station for the Atlantic Improvement Co., Astoria, L. I. There will be two buildings, a boiler-house 62 ft. wide and 85 ft. long, with a dynamo-room 70 ft. wide and 130 ft. long. The dynamo-room is controlled by a traveling crane, to be furnished by the same firm.

Air Resistances of Curved Surfaces.

A very elaborate paper on the resistance to air currents of both stationary and moving bodies with curved surfaces was recently prepared by Prof. Georg Wellner, of the Royal Technical College, at Brünn, Austria, and appeared in several successive numbers of the *Zeitschrift* of the Austrian Engineers and Architects' Society, beginning with the issue of June 23 of this year. Professor Wellner's investigations, which, in the main, were experimental in character, were prompted by the increasing attention latterly given to the problem of aerial navigation and the generally appreciated lack of data on the magnitude and direction of air resistances encountered by surfaces exposed to air currents at very slight angles. To those more particularly interested in the subject, therefore, the large number of tabulated results of measurements which he has given together with the descriptions of the experimental apparatus employed and the conclusions at which he has arrived, will prove of value and are desirable for reference. The part of the work done by him, which will probably appeal more especially to most of the readers

of the *Railroad Gazette* is that relating to the air resistances of surfaces in motion, the investigations of this branch of the subject having been made on a nine mile section of the railroad between Brünn and Strelitz which had been placed at his disposal by the railroad company. An elaborate series of measurements was there made, the recording instruments being carried on the several trains running over the line at different speeds and on different days with varying atmospheric conditions. Painstaking care seems to have been used in the gathering of the data and the working out of the several values, and the contribution as a whole can undoubtedly claim to be one of the most thorough and comprehensive ones that has yet been made to the subject. For obvious reasons, however, we cannot undertake to enter into it here in even the most superficial manner, but must content ourselves with simply this reference to its treatment in our Austrian contemporary.

Silk from Wood-Pulp.

The manufacture of silk from wood-pulp would, at first sight, appear to be mythical, but it is a fact that the work is now being accomplished, and that a mill for the manufacture of the silk is in full operation at Besançon. The process is that of M. Chardonnat, and is described in detail in a recent report of the United States Consul at St. Etienne. It may be summarized as follows: The wood-pulp, such as employed in paper-making, after being carefully purified by acid and dried in alcohol, is dissolved in a mixture of pure ether and alcohol, thus forming a viscous collodion, like that used in photography. This collodion is placed in a vessel where, under air pressure, it is first of all forced through a filtering apparatus, and then into a horizontal tube, having a number of glass exit tubes of very small bore. From these tubes the collodion issues in threads so fine that six of them must be combined to make a strand of the necessary consistency for weaving. On its exit the thread passes through a vessel of water, which frees it from its surplus ether and alcohol, and thus helps it to become a solid. It is also subsequently passed through a bath of ammonia to deprive it of its highly inflammable property.—*Chambers' Journal*, London, July.

Prince Edward Island Tunnel.

Engineers left Ottawa last week to resume work and complete the submarine drillings started last summer in connection with the proposed tunnel under the Northumberland Straits, to connect Prince Edward Island with the mainland.

Electric Water Power Installation at Chur, Switzerland.

One of the latest electric water power plants in Switzerland, in which country, by the way, power installations of this class have been developed more than in any other, is that at the small town of Chur, at the junction of the Rabins and Plessur rivers. The water is taken from the former, and the power, about 500 H. P., is used both for electric lighting and for driving electric motors. The head of water available is about 190 ft., the river Rabins being dammed naturally by a huge mass of rock. The power station contains two turbines coupled to a common shaft. Ordinarily, however, only one of the wheels is in operation.

The extent of the electric distributing system, and the distance of the power station from the town made the use of a high-tension, alternating current desirable, and the proposed dynamo equipment, therefore, was to consist of five 100-H. P. generators, and capable of supplying a current of 33 amperes and 2,000 volts. Three such generators are now in place. The transmission cables run overhead from the station to the outskirts of the town, being carried on oil insulators, and within the town they are laid underground. The converters are located in the cellars of the various buildings supplied with current, the secondary current having a voltage of 120. Each arc lamp has its own converter, by means of which the 2,000-volt current is brought down directly to one of 40 volts.

Completion of the Stewart Avenue (Chicago) Interlocking Plant.

One of the most complicated interlocking plants in the world was put into operation in Chicago last Sunday at the Stewart avenue, the Canal and Sixteenth street and the "St. Charles Air Line" crossings, and one of the most dangerous railroad crossings becomes as safe as such grade crossings can be made with existing safety appliances. At this crossing tracks of the Chicago & Western Indiana, the Chicago & Alton, the Pittsburgh, Ft. Wayne & Chicago, the Illinois Central, and the Atchison, Topeka & Santa Fe all cross and all have transfer tracks and portions of yards near by. On the tracks of the Western Indiana run the trains of the Louisville, New Albany & Chicago, the Chicago & Grand Trunk, the Chicago & Erie, the Chicago & Eastern Illinois, and the Wabash railroads. To give an idea of the number of trains that use this crossing and adjacent switches during 24 hours is impossible, as there are no figures available, but it is safe to say that there is scarcely a minute during the whole time when a train is not in sight. Several years were occupied in designing the plant, much of the work of which was done by Messrs. E. L. Cortell and J. F. Wallace. The work of installing it has occupied more than a year, having been begun on June 4, 1892, and completed a few weeks ago. The system used is the Westinghouse elec-

tro-pneumatic and the apparatus was installed by the Union Switch & Signal Company.

The plan of the tracks and scheme of interlocking was illustrated in the *Railroad Gazette* Jan. 20, 1892, and some of the data given with the illustration is sufficiently interesting to be repeated here. There are 84 signals, 37 signal switches, 22 double slips and 22 movable frogs, all of them worked from a machine having 48 working levers and six spare spaces occupying a floor space 5 ft. x 24 ft. There is about 10,000 ft. of detector bar, the largest amount ever worked from one machine. With a mechanical machine, according to American practice, a machine of 187 working levers occupying a floor space of 14 ft. x 77 ft. would be required; and if the English practice were followed a machine of 243 working levers and a floor space 17 ft. x 93 ft. would be necessary. An interesting feature of this plant is the illuminating of each signal by electricity, the current for which is supplied from the power house.

At 9 o'clock Sunday morning the first connection with the switches and signals was begun and the last one was completed at 10:30, the work of connecting occupying only an hour and a half. The plant was put in operation officially at 12 o'clock noon, and no difficulties were experienced.

THE SCRAP HEAP.

Notes.

The entire 189 miles of the Pittsburgh Division of the Pittsburgh, Fort Wayne & Chicago is now operated under the block signal system.

The Southern Pacific has subscribed \$50,000 to the midwinter fair which it is proposed to hold in San Francisco the coming winter. A considerable number of exhibitors at the World's Fair have agreed to support this California fair.

The Burlington's offer of free transportation to the World's Fair to the employees on the Iowa Division is conditioned on the journey being taken "while travel is light." The Pennsylvania's trains for carrying its employees to Chicago are loaded with 500 or 600 passengers each.

The Illinois Railroad Commissioners have approved interlocking signals at a crossing of the Illinois Central and the Lake Shore & Michigan Southern, and of the Illinois Central and the Elgin, Joliet & Eastern; also of the signals at Alvan at the crossing of the Chicago & Eastern Illinois and the Illinois Central.

On the night of Aug. 2 a freight train of the Lake Shore & Michigan Southern was boarded by about 60 tramps, at Tolleston, Ind., and the trainmen were terrorized. One of the tramps was shot by a companion while on the train. Seven of them were captured. On the night of the 5th, at Delphos, O., a passenger train of the Pennsylvania was boarded by 25 tramps, of whom a few were captured. They said they wanted nothing but free transportation eastward. The Fitchburg road has been arresting considerable numbers of vagrants in the vicinity of Boston.

South American Notes.

The Central Argentine Railroad is commencing work on a branch line from Victoria Station to San Antonio de Areco, a distance of 23 miles. This will connect the northern section of the Central Argentine with the Pergamino line, shortening the journey from Buenos Ayres to Córdoba by 14 hours.

A movement is said to be on foot in Buenos Ayres to hold an international exhibition in that city. Such a measure might be turned to great advantage by our manufacturers, particularly after the completion of the Trans-Andine Railroad.

The following table of gross receipts of eight principal Argentine roads from Jan. 1 to July 8 for 1893 and 1892 respectively demonstrates a gratifying increase of prosperity for that debt-ridden country:

	1893.	1892.	Increase
Buenos Ayres Great Southern	\$5,209,188	\$4,740,598	\$468,590
Buenos Ayres Western	2,871,615	2,176,505	705,110
Buenos Ayres & Rosario	1,591,239	1,349,211	242,028
Central Argentine	1,723,242	1,377,849	345,393
Buenos Ayres & Eusebada	337,520	302,569	34,951
Buenos Ayres & Pacific	2,064,757	1,686,175	378,582
Córdoba Central	1,543,076	1,475,668	67,408
Córdoba & Rosario	885,998	407,332	478,666

The project for the proposed grand central station in Buenos Ayres is apparently taking a definite shape. The plan which has now been laid before the government is substantially that which was favored by President Pellegrini's administration. The government is asked to cede 70 acres of land adjoining the Madua Docks, between the foot of Calle Cuyo and Calle Belgrano; the terminus and works to be forever free from all national and municipal taxes; all materials to be imported free of duty; all railroads to be allowed access to the terminus; a tunnel 1,300 yards long to be built from Plaza Constitución to the foot of Calle Brazil; an embankment for the tracks of the Rosario Railroad to be built along the river for a distance of 3,400 meters, the embankment to be protected by a breakwater from the mouth of Maldonado Arroyo to the gas house. The estimated cost of these improvements is:

Branch line, Caballito to Barracas	£110,000
Tunnel	320,000
Embankment and breakwater	413,000
Grand central station	350,000

Total.....£1,263,000

It is reported that work will be commenced in October upon the Guadalajara & Western Railroad of Mexico, for which a concession was granted to Messrs. L. Nien-dorff, William Dick and A. L. Clark. This road will form a continuous line from San Luis Potosí to Chame-la, on the Pacific coast, passing through Coahuila, which will be the end of Section 1. The total length of the line will be 509 miles, and is estimated to cost \$25,000,000.

The total number of immigrants arriving in Argentine direct from Europe in the last 36 years amounts to 1,355,000; of these 817,000 were Italians. Spaniards come next, with 239,000, followed by Frenchmen to the number of 141,000. In 1892 upward of 11,000 emigrants settled in Argentine.

Minnesota State Elevator.

The following bids have been received by the Minnesota Railroad & Warehouse Commission for the erection of the state grain elevator at Duluth: Butler Bros., St. Paul, \$209,000; Heidenrich Co., Chicago, \$242,000; Metcalf-McDonald Co., Chicago, \$239,000; J. T. Moulton & Son, Chicago, \$237,000; F. H. O'Neill, St. Louis, \$198,700; Barnett & Record Co., Minneapolis, \$229,500, and Honstein Bros., Minneapolis, \$238,000.

The bids are for the entire work, including grading of site and dredging of the slip alongside of dock. The contract has not yet been awarded.

Opening of the Corinth Canal.

The Corinth ship canal was opened by the King of Greece on Aug. 7, in the presence of all the members of the royal family, the cabinet ministers, the foreign diplomatic representatives, the principal military and civil officials and a crowd of citizens.

The first sod of the canal across the Isthmus of Corinth was turned by the King of Greece in April, 1882. The isthmus is about three and three-quarters miles in breadth. In the middle of the isthmus is a ridge 120 to 180 ft. high, which is approached on each side by a plain from the seashore. The canal is 68 ft. wide at the bottom, 80 ft. at the water line and 26 ft. deep. Items concerning its construction were printed in the *Railroad Gazette* Feb. 3 and March 10 last.

Dredging Gladstone Harbor.

The Racine Dredge Co., of Racine, Wis., has the contract for dredging a 19-ft. channel from the "Soo" docks at Gladstone, Mich., to the main channel in the Little Bay Du Noc. The work aggregates 80,000 yards and is already well under way.

Calumet and Pullman Electric Railroads, Chicago.

About two years ago the Calumet Electric Street Railway Co. began building its line at South Chicago, and during the two years has continued building so steadily that at the present time it has over 40 miles of track extending through South Chicago, and west and north to Jackson Park, making connections at Sixty-third street with the South Side Rapid Transit road, and at Sixty-seventh street with the Chicago City cable system. The electric system also extends west and south from South Chicago to West Pullman, where extensive manufacturing are now being erected. Last week extensions of the Pullman and Calumet lines were completed to a junction at Ninety-seventh street and Stony Island avenue, and the two roads are to be operated as one line. Cars began running over the extensions last Monday, and now Pullman has street car connections with all the adjacent Chicago suburbs and with the car lines of the city. The combination of the two lines makes a very extensive electric street railroad system. The Calumet line is laid with 78-lb. Johnson girder steel rails on oak ties. It is equipped with overhead trolley system of wires. The engineering work was done under the direct supervision of Mr. John Dougherty, of New York City. The Pullman double deck cars are to be run on the Pullman line and the Calumet connecting line, they being similar to those running on the Brookline division of the Boston Electric street road.

The Transatlantic Mail Service.

It was stated in the British House of Commons last week that the Government had decided to abandon as too costly the experiment that had been tried of forwarding the American mails to London by a special train. Hereafter, if a steamer arrives at Queenstown when the ordinary rail services cannot be availed of, her mails will be landed at that port, but they will be taken to Liverpool. The Postmaster-General added that he did not think this plan would make much difference to those concerned. The special train experiment had involved an expenditure of £150 every time that it had been tried, and special trains had been engaged about a dozen times a year.

A Railroad Project in Northern India.

One of the most promising of the proposed new railroads in India would appear to be a line projected by a company of merchants of Karachi, East India, to extend from that city to Delhi, the most important trade centre of Northern India. Mr. Jehangir H. Kothari, an influential merchant of Karachi, and an enthusiastic advocate of this road, has recently visited this country, on a tour around the world, and while in New York City had conferences with several bankers regarding the financial part of the project. He hopes to interest American capitalists in the project, and arrange with them for building the road, with such financial assistance as may be secured from the local merchants. Mr. Kothari has given us some particulars of the railroad. It will have for its western terminus Karachi, a town in East India and an important port on the Arabian Sea, near the northern boundary of Hindoostan, and about 600 miles north-west of Bombay.

A railroad is already built east of Karachi, via Kotri and Hyderabad, to Umkrot, some 200 miles, and this line it is proposed to take over and extend north-east about 500 miles, to Delhi.

The importance of this line lies in the fact that it gives a nearly direct route between Delhi and the northern and interior districts of India to a sea port on the north-western coast, as will be readily seen by a glance at the map of India. The present railroad traffic to these districts now makes long detours to reach Bombay or other coast towns. The new line would extend through the vast wheat and cotton growing plains of northern India, and would have tributary to it the trade of the Punjab and many large towns, as well as Delhi. A survey has been made by Mr. Horace Bell, who makes a favorable report upon the route, and estimates the cost per mile at 85,000 rupees, or about \$28,000 per mile. A prospectus has been issued and further particulars of the enterprise will be furnished to those interested, by Mr. Kothari, who may be addressed at Karachi, India.

CAR BUILDING.

The Bloomsburg Car Co. is building 100 steel cars to be used in transporting cement.

The Boston & Maine has just received two new parlor cars from the Pullman Car Co., which completes the order of 15 vestibuled parlor cars ordered some time ago, together with 15 vestibuled sleeping cars, which have also been delivered.

BRIDGE BUILDING.

Allentown, Pa.—Bids have been received, but no contract as yet awarded, for a new iron 55-ft. bridge over the Sancon Creek, in Upper Sancon Township. There are seven bidders.

Belair, Md.—Plans for a new bridge over Deer Creek have been laid before the Board of County Commissioners.

Columbus, O.—Proposals for a plate girder bridge with a 70 ft. span over the canal on the Clickinger road will be received by the County Commissioners up to Aug. 24. Owing to the failure of the purchasers of \$100,000 worth of bonds to take the bonds, no contracts can be made for the construction of the proposed new bridges at Westerville, over Big Darby Creek, and on East Broad street in this city for some weeks, and new proposals for the sale of the bonds will be asked by the County Commissioners, and the projects will have to wait till after the bonds are sold. Ironwork for the Front street viaduct over the Little Miami Railroad is arriving and the work of erecting it will commence at once.

Delaware County, Pa.—It has been decided by the County Commissioners to erect a new bridge at Shoemakerville, between Media and Chester. The total length of the structure will be 443 ft.

Elmira, N. Y.—The Elmira Bridge Co. has shipped one of the two girders for the two track plate girder bridge of the New York Central Railroad at Oriskany, N. Y. The girder is 90 ft. long, 9½ ft. deep and weighs 35 tons.

Harrisburg, Pa.—An ordinance has been introduced in Common Council providing for the erection of an iron bridge over the canal at Market street. The estimated cost is \$8,000.

Hitchingbroke, Que.—The contract for building the McCurry bridge has been awarded to J. Johnson.

Hull, Quebec.—Application has been made to the Dominion Government for power to construct the proposed new bridge over the Gatineau River, between Hull and Gatineau Point. Tenders for the stone piers and iron superstructure will be called for in a few weeks, and the work will be proceeded with this fall. To erect the stone piers will increase the cost of the bridge, but it is expected that the additional amounts will be made up by grants from East and West Templeton, L'Ange Gardien and other municipalities directly benefited by the bridge.

Narrows, N. B.—The plans of R. B. Rogers, Superintendent of Trent Valley Navigation, for the new iron bridge have been accepted, and tenders will be invited shortly.

Niagara Falls, Ont.—An iron bridge is to be built by the Niagara Falls Electric Railroad across Smeatons, Ravine, Queenstown.

Norrisown, Pa.—The Grand Jury has recommended the erection of a bridge over a portion of the Perkiomen River at Landis' Mill.

Philadelphia.—The partial destruction of the Falls of Schuylkill Bridge on Sunday last probably only hastened the work of demolishing that structure, as bids had been received for that purpose. The erection of a new bridge at the site has been contemplated for some time by the Department of Public Works, and plans were prepared in December last for a new structure. These plans provide for a bridge with two decks, the upper one, 62 ft. above the river surface with a width of 71 ft. and a total length of roadway of 1,131 ft. The lower deck will be 22 ft. above the river. The main bridge will have three spans of 190 ft. The superstructure will be entirely of steel and the construction of the Pratt truss system. The total cost, exclusive of land damages, is estimated at \$700,000, and the matter will probably come before the City Council next month.

St. Thomas, Ont.—James A. Bell, County Engineer, reports that a 30-ft. span bridge is to be built over Big Otter Creek, between Bayham and Middleton; that the Grange street bridge is to be rebuilt at a cost of \$1,933, and the Port Burwell bridge at a cost of \$1,860.

Windsor, Ont.—Plans are being prepared for the new bridge over the Michigan Central R. R. at this place. It will cost about \$15,000.

Youngstown, O.—The bids opened for the Holton street viaduct superstructure were as follows: Wisconsin Iron & Bridge Works, \$19,169 on draw and side spans, and \$39,800 on viaduct; King Bridge Co., \$52,600 on viaduct; Youngstown Bridge Co., \$58,500; Detroit Bridge & Iron Works, \$52,218. The award of the contract will not be made for some days. It is among the probabilities that a new bridge will be built at Spring Common, on the West Side, a movement of citizens being on foot to effect such an enterprise.

The Youngstown Bridge Co. is building three girders for a bridge at Duluth, each being 86 ft. long and weighing 30 tons.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Indiana the Supreme Court holds that the successor of a railroad company by purchase is liable for damages for breach of a covenant of the right-of-way deed to its predecessor, providing that the grantee should fence the road and forever maintain the same, put in cattle guards and wagon crossings whenever demanded, and make a wagon and stock passageway under the road.

The Supreme Court of California holds that an action on a note by a bank against a railroad company is an action at law, and the court has no power to appoint a receiver for the railroad company, though it consents to such appointment, and though the complaint alleges that it is insolvent, that other creditors are threatening to sue, that defendant has no property out of which to satisfy such judgment, and that the action is brought in behalf of all other creditors willing to come in as plaintiffs.

In Oregon it is held that a city, under a grant of exclusive power "to permit, allow and regulate" the laying of tracks for street cars, has not power to grant for a term of years the exclusive right to occupy its streets with street railroads.

The Supreme Court of Illinois decides that a train designated as a "fast mail train," and used mainly for carrying the mail, but which also has cars for the use of passengers, is a "regular passenger train," within the

meaning of the statute, which declares that "all regular passenger trains shall stop a sufficient length of time at the railroad station of county seats to receive and let off passengers with safety."

Carriage of Goods and Injuries to Property.

In South Carolina it is held that if property is damaged, while in the charge of a common carrier, to a greater extent than the bill for freight, the lien of the carrier is extinguished; and the consignee not only has the right to demand the property of the carrier without payment of the freight charges, but retention by the carrier amounts to a conversion, for which trover will lie.

The Supreme Court of Arkansas holds that where a carrier affords shippers no opportunity to contract for the transportation of freight under its common-law liability, but receives only upon condition that exemption be accorded it, a contract containing such exemption is void, and the fact that it was entered into knowingly by a shipper, and without demand for any different contract, makes no difference.

In the Supreme Court of New York it is laid down that samples of merchandise contained in the trunks of a commercial traveler, and belonging to his employer, do not form a part of his baggage; and, where such samples are checked as baggage on a railroad over which he takes passage, the mere facts that he paid an excess baggage charge demanded because the weight of the trunks exceeded the limit fixed for free transportation, and that he informed the baggage agent that the trunks contained samples, do not show that the company undertook to carry such samples as freight, so as to render it liable to the owner for their loss or destruction, in the absence of any showing that it or its agents were informed that the samples were owned by any one else than the passenger.

The Supreme Court of Mississippi holds that where plaintiff's servant, employed to manage his farm, sees a fire in a stump near defendant railroad, which passes through the farm, which fire has been started by a passing locomotive and knows it is likely to spread to an adjacent field, but goes away without attempting to extinguish it, and the crop in the adjacent field is burned, he is guilty of negligence, and plaintiff cannot recover, even if defendant's servants afterward saw the same fire and neglected to extinguish it.

The Supreme Court of Minnesota rules that the neglect of the statutory duty to fence a railroad right of way is not excused by the fact that the construction of cattle guards so as to completely inclose the track is impracticable.

Injuries to Passengers, Employees and Strangers.

In Texas the Supreme Court rules that a female passenger, whose train is not stopped at her destination, but the speed of which is slackened so as to enable male passengers to alight in her presence, is not guilty of contributory negligence in jumping off the train, pursuant to directions given her by the carrier's servants.

In New York a brakeman in defendant railroad company's employ was killed by an engine by reason of his foot being caught in a frog on the track. He had been in defendant's employ for several years, and he knew that the larger portion of the frogs on defendant's tracks were not provided with blocks; he had been employed around the frog at which the accident occurred for over an hour, and with slight vigilance he could have seen that it was not blocked. The Supreme Court rules that in the absence of evidence that blocks were in general use on defendant's tracks, or on those of other roads, the failure of defendant to provide a block for the frog at which the accident occurred was not negligence, and that the brakeman must be held to have assumed the risks incident to the use of the frog.

The Supreme Court of West Virginia holds that the fact that a rule of a railroad company forbids a foreman to run a hand car on Sunday without special permission will not excuse the company from liability for the death of a section hand who had been ordered by the foreman to repair the track, and who was killed on Sunday, while returning on a hand car, unless decedent knew that he was violating a rule of the company.

In Alabama it appeared that the company had a rule, with which plaintiff was familiar, prohibiting coupling, except with a stick, or going between cars for that purpose where an engine was attached to the cars. Plaintiff, while coupling a car attached to an engine to a stationary car, voluntarily placed himself between the rails, with his back to the engine, when the cars came together, and injured his arm. The Supreme Court rules that he was guilty of contributory negligence.

In the same state it is laid down that rules of a railroad that employees are to see that the machinery and tools are in proper condition, and, if not, to see that they are put so before using them, and that trainmen handling cars are to see if they are safe to be handled, and not to handle them unless they are safe, are reasonable and proper, and a brakeman is bound to make such examination of the cars and machinery he uses as is consistent with the opportunities afforded while attending to his other duties, and, if his injury arises from his failure in this respect, he is guilty of contributory negligence; but whether he made an examination, or not is a question of fact for the jury.

In Kentucky, in an action against a railroad company for the death of a laborer, killed by an engine while wheeling ballast near the track, plaintiff's evidence showed that the train hands neglected to give a warning signal, as required by the rules of the company, until within a few feet of deceased, whose back was turned toward the train, and who did not hear its approach, because of the wind and the noise of his wheelbarrow on the plank. The Court of Appeals rules that such evidence showed defendant to be negligent in not giving the warning whistle, and that defendant's motion for a peremptory instruction in its favor was properly denied.

Under the common law both in Alabama and Mississippi a master is not liable for an injury inflicted on one servant through the negligence of a fellow servant. In Alabama this rule is modified by the employers' liability act, but no similar law is in force in Mississippi. Plaintiff was injured while employed on defendant's railroad as a brakeman, the injury being sustained in Mississippi, through the negligence of his fellow servants. Plaintiff, a citizen of Alabama, was working for defendant under a contract made in that state, and defendant was a corporation organized under the laws of the same state. The Supreme Court of Alabama rules that plaintiff could not recover in Alabama for the injuries, the action not being maintainable in Mississippi.

In Indiana it is held that a parole promise to re-employ him is a sufficient consideration for a release, executed by an employee, of a claim for personal injuries.

In Oregon it is ruled that whether it was negligence for a railroad company to send out a train loaded with workmen without making any investigations as to the

condition of a bridge over which it must pass, is a question for the jury, there having been an unusually severe storm since it was inspected.

In Texas it appeared that, while loading cars belonging to defendants with wood furnished them under contract by one B., in whose employ plaintiff was, he was requested by a brakeman in defendants' service to assist in pushing two cars then loaded, and was directed to get between the cars, in order to move them more easily, and, while pushing the front car, the brakeman, without warning plaintiff, unfixed the brake, which was set, whereby the cars were caused to move suddenly forward, and plaintiff was injured. The Supreme Court rules that the plaintiff, the jury having found that he was acting in the interests of his employer when hurt, could recover for the negligence of the brakeman.

- ¹ Toledo, St. L. & K. C. R. Co. v. Cosand, 33 N. E. Rep., 251.
- ² Smith v. Superior Court of Los Angeles, 32 Pac. Rep., 322.
- ³ Parkhurst v. City of Salem, 32 Pac. Rep., 304.
- ⁴ Ill. Cent. v. People, 33 N. E. Rep., 173.
- ⁵ Miami Powder Co. v. P. R. & W. C. Ry., 16 S. E. Rep., 339.
- ⁶ L. R. & F. S. v. Cravens, 20 S. W. Rep., 302.
- ⁷ Talcott v. Wabash R. Co., 21 N. Y. S., 313.
- ⁸ Illinois Cent. R. Co. v. McKay, 12 South. Rep., 447.
- ⁹ Nelson v. Great Northern, 53 N. W. Rep., 1129.
- ¹⁰ Texas & N. O. v. Bingham, 21 S. W. Rep., 669.
- ¹¹ Spencer v. N. Y. C. & H. R., 22 N. Y. S., 100.
- ¹² Gregory v. Ohio River R. Co., 16 S. E. Rep., 819.
- ¹³ R. & D. v. Free, 12 South. Rep., 294.
- ¹⁴ L. & N. v. Pearson, 12 South. Rep., 176.
- ¹⁵ Barber v. C. N. O. & T. P., 21 S. W. Rep., 340.
- ¹⁶ A. G. S. v. Carroll, 13 South. Rep., 303.
- ¹⁷ Penn. Co. v. Dolan, 32 N. E. Rep., 302.
- ¹⁸ Conlon v. O. S. L. & N. N., 32 Pac. Rep., 397.
- ¹⁹ Bonner v. Bryant, 21 S. W. Rep., 549.

MEETINGS AND ANNOUNCEMENTS.

Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

- Chicago & Alton*, quarterly, 2 per cent. on preferred and common stocks, payable Sept. 1.
- Cleveland & Pittsburgh*, quarterly, 1½ per cent. upon the guaranteed stock, payable Sept. 1.
- Illinois Central*, semi-annual, 2½ per cent., payable Aug. 9.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

- Chicago, Milwaukee & St. Paul*, annual, Milwaukee, Wis., Sept. 20.
- Iowa Central*, annual, New York City, Sept. 8.
- Toledo & Ohio Central*, annual, Toledo, O., Sept. 4.
- Wabash*, annual, St. Louis, Mo., Sept. 12.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

- The *New England Roadmasters' Association* will hold its annual convention at the American House, Boston, Mass., Aug. 16 and 17. The programme of this meeting was published Aug. 4, p. 595.
- The *American Association of General Passenger and Ticket Agents* will hold its next annual convention in Milwaukee, Wis., Sept. 19.

The *Railway Freight Claim Association* will hold its next annual convention at the Hotel Cadillac, Detroit, Mich., Aug. 9.

The *Master Car and Locomotive Painters' Association* will hold its next annual convention at Odd Fellows' Hall, Milwaukee, Wis., Sept. 13, 14 and 15. The headquarters of the Association will be at the Kirby House, corner of Mason and Water streets. The programme of this meeting was published in our issue of July 28, p. 575.

Contracting Freight Agents.

The National Association of Contracting Freight Agents held its annual session in Milwaukee last week. The following officers were elected: President, F. W. Boltz, Cleveland; Vice-President, E. J. Seymour, Milwaukee; Secretary and Treasurer, S. Gans, Jr., Cincinnati. The next meeting of the Association will be held at Niagara Falls in August, 1894.

PERSONAL.

—Mr. George C. Thomas, of the firm of Drexel & Co., of Philadelphia, has resigned as a director of the Lehigh Valley road.

—Mr. D. B. Henderson has been appointed President of the Galveston & Western Railroad, in Texas, vice Mr. Walter Gresham, resigned.

—Mr. J. H. Mann, recently Traveling Freight Agent for the Jacksonville Southeastern, is now General Freight Agent of the St. Louis & Chicago.

—Mr. James Cunningham has been appointed Master Mechanic of the Choctaw Coal & Railway Company with office at South McAlester, Indian Ter.

—The appointment of Mr. S. C. Mason as Assistant Statistician of the Interstate Commerce Commission to succeed Mr. James A. Case, resigned, was announced this week.

—Mr. E. Ellery Anderson has been appointed Government Director of the Union Pacific. Mr. Anderson is a lawyer of New York City, and was the working member of the Pacific Railroad Investigating Commission of 1887.

—Mr. Darwin F. Coe has been appointed Traffic Manager of the Elkhart & Western road, with office at Elkhart, Ind. H. E. Bucklen is President, and E. C. Bickel is General Manager of the company, which has its road now in operation between Elkhart and Mishawaka, Ind.

—Maj. J. F. O'Brien, Superintendent of the Louisville Southern road, has resigned, and the division will be added to the jurisdiction of Superintendent W. J. Murphy, of the Cincinnati, New Orleans & Texas Pacific. Mr. O'Brien became Superintendent of the Louisville Southern in 1891.

—Mr. E. W. Verrinder, Traffic Superintendent of the London & Southwestern, died July 23, at the age of 56. Mr. Verrinder held this position for many years and had been in the service of the London & Southwestern for 42 years. He was as eminent for his amiability as for his efficiency as an administrator.

—Mr. W. E. Knox, Chief Train Dispatcher of the South and North Alabama Division of the Louisville & Nashville, has been appointed Superintendent of the division. Mr. T. K. Scott, the former Superintendent, is to act as General Manager of the Georgia road during the extended leave of absence of General Manager Green.

—Mr. James E. Palmer has been appointed General Superintendent of the Peoria & Pekin Union road, vice Mr. C. E. Schaaf, who resigned recently to accept a position with the Cleveland, Cincinnati, Chicago & St. Louis. Mr. Palmer has heretofore been Engineer of Maintenance of Way on the Peoria & Pekin Union road.

—Mr. W. A. Stevenson has been appointed Trainmaster of the Lehigh Valley, with headquarters at Sayre, Pa. He was formerly Superintendent of the Buffalo Division previous to its consolidation with the Seneca Division, and during the past two months has been engaged in the office of Superintendent Fennel, at Buffalo.

—Mr. A. G. Wells, formerly Superintendent of the Indianapolis and later of the St. Louis Division of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed Superintendent of the Atlantic & Pacific, with headquarters at Albuquerque, N. Mex. Before going to the "Big Four" Mr. Wells held the position of Trainmaster on the Atlantic & Pacific.

—Mr. John Lowler Welsh was this week appointed a Receiver of the Philadelphia & Reading to succeed Mr. Elisha P. Wilbur, President of the Lehigh Valley road, who has resigned. Mr. Welsh was recently elected to the Board of Managers of the railroad company and represents the interests of Drexel, Morgan & Co. He is credited with drafting the plan of reorganization for mulated this spring.

—The appointment of Mr. William M. Greene as General Manager of the Cincinnati, Hamilton & Dayton was announced by President Woodford this week. When the rumors of this appointment were published in June they were denied, but it now appears that the appointment had then been considered. Mr. Greene was formerly General Manager of the Cleveland, Cincinnati, Chicago & St. Louis.

—Mr. Samuel F. Parrott has been appointed Superintendent of the Columbus Southern road in Georgia and will succeed Mr. Cecil Gabbett, who resigned the position of General Manager last week to give his entire time to the Savannah, Americus & Montgomery, of which he is also General Manager. Mr. S. F. Parrott is a brother of Mr. G. W. Parrott, of Atlanta, who is Secretary and Treasurer of the Columbus Southern road.

—Mr. J. G. Woodworth has resigned as Assistant General Freight Agent of the Union Pacific, to accept on Aug. 15 the position of General Freight Agent of the Iowa Central Railway, vice Mr. A. F. Banks, now Traffic Manager of the Elgin, Joliet & Eastern. Mr. Woodworth entered the railroad service in 1879. He has been Assistant General Freight Agent on the Union Pacific since 1888, and was transferred to Omaha last November.

—Mr. Charles H. Rockwell, Assistant to the President of the Chicago & Eastern Illinois road, has resigned that position, which he has held since January last. He was formerly General Superintendent of the road and also of the Columbus, Hocking Valley & Toledo. He was for some years General Passenger Agent of the Cincinnati, Hamilton & Dayton, and it is reported that he may return to the service of that company in his old position.

—Mr. F. M. Gault, General Manager of the Omaha & St. Louis Railroad, has resigned and will remove to Chicago, having accepted a position with office in that city. Mr. Gault has been General Manager of the railroad since June, 1888, the company having been organized in 1887. He had previously been Agent of the Wabash at Council Bluffs and General Agent at Council Bluffs and Omaha, the road now called the Omaha & St. Louis being then a division of the Wabash.

—Mr. Alonzo Dolbeer, who recently resigned as Division Master Mechanic of the Philadelphia & Reading (Lehigh Valley), at Buffalo, N. Y., received a handsome gold watch from the men in the Buffalo shops on his retirement. Mr. Dolbeer was formerly Superintendent of Motive Power of the Buffalo, Rochester & Pittsburgh, and since March last has been Master Mechanic of the Lehigh Valley shops at East Buffalo. His successor is Mr. John Campbell, Division Master Mechanic of the Lehigh Valley, in charge of the shops at Delano, Pa.

—Mr. E. S. Moffat, of Scranton, Pa., died in Edinburgh, Scotland, on Aug. 4. Mr. Moffat was President of the Lackawanna Iron & Steel Co., and had been abroad with his family for some months. After the resignation of W. W. Scranton as General Manager of the Lackawanna Iron & Steel Co., Mr. Moffat removed to Scranton, assuming control of the blast furnaces. About one year after he became General Manager of the company's interests in Scranton, and one year ago was elected President of the company, retaining also the position of General Manager.

—Mr. Henry F. Whitcomb has resigned as General Manager of the Milwaukee, Lake Shore & Western, and will retire from railroad service. This road is to be hereafter operated as a division of the Chicago & Northwestern, which leases it, and Mr. Whitcomb was tendered the position of Assistant General Manager of the Chicago & Northwestern, in charge of the new division. He, however, declined to accept the position. He retires after a continuous connection of 28 years with Wisconsin railroads. He has been General Manager of the Milwaukee, Lake Shore & Western since 1885, and was General Freight and Passenger Agent for more than ten years.

—Mr. Wilmot K. Morley, Superintendent of the St. Louis & Kansas City Division of the Chicago & Alton, with headquarters at Roodhouse, Ill., resigned last week. Mr. E. J. Sanford, Assistant Superintendent, with office at Slater, Mo., has also resigned. The resignation of Mr. Arthur M. Richards as Superintendent of the Chicago Division was announced last week. He had been in the service of the company 27 years, and Mr. Morley has been connected with the company nearly as long, his service beginning in 1867 as station agent and telegraph operator. He was promoted to be Chief Train Dispatcher and Superintendent of Telegraph, and in 1888 became Division Superintendent. These three offices are to be abolished on account of the falling off in business.

—Mr. George F. Copeland was on the 1st inst. appointed Superintendent of the Butte, Anaconda & Pacific, with headquarters at Anaconda, Mont. Mr. Copeland began his railroad career in 1867, when 23 years of age, as rodman on the Illinois Central, on the construction of that line from Iowa Falls to Sioux City. In 1869 he went to the Cincinnati Short Line, now part of the Chicago, Hamilton & Dayton, then under construction, and in 1870 to the Buffalo, Rochester & Pittsburgh, on construction work. In 1871 he

entered the service of the Flint & Pore Marquette, continuing with that road until 1877, when he went to the St. Paul & Pacific, afterward the St. Paul, Minneapolis & Manitoba, as Assistant Superintendent of the Northern Division. In 1883 he was appointed Trainmaster of the St. Paul & Duluth, and later was promoted to be Superintendent, holding that position when he resigned in January, 1892, on account of ill health.

ELECTIONS AND APPOINTMENTS.

Atlanta & West Point.—The stockholders of the railroad elected the following officers last week: President, C. H. Phinney; Directors, W. B. Berry, E. P. Chamberlin, T. L. Langston, H. C. Fisher, H. M. Comer, John S. Bigby. The directors re-elected Edmund L. Tyler General Manager. All the above are re-elections except John S. Bigby, who takes the place of Maj. D. N. Speer, deceased.

Butte, Anaconda & Pacific.—George F. Copeland has been appointed Superintendent, with headquarters at Anaconda, Mont.

Chesapeake, Ohio & Southwestern.—As the lease of this road to the Newport News & Mississippi Valley Co. has expired the former company will take charge of the road. The headquarters will be in Louisville. Epes Randolph will continue as General Superintendent and Chief Engineer; L. T. Day, Traffic Manager; C. F. Krebs, Auditor.

Chicago & Northwestern.—The Milwaukee, Lake Shore & Western, leased by the above company, will be formally consolidated on Sept. 1 with the main line, and after that date will be operated as the Ashland Division. The present officers of the road will generally retain their present positions as officers of the division. The position of Assistant General Freight Agent, with headquarters in Milwaukee, will be taken by C. L. Wellington, now General Freight Agent of the road; that of Division Superintendent by George F. Bidwell, General Superintendent of the old road, whose headquarters in future will be at Kaukauna. E. H. Rummele, Chief Engineer, will be Division Engineer, with headquarters at Kaukauna, while Robert Quayle, Master Mechanic, will be Division Master Mechanic, retaining his headquarters at Kaukauna.

Chicago & Texas.—The following is the list of officials: E. A. Hitchcock, President, St. Louis, Mo.; O. L. Garrison, Vice-President and Treasurer, St. Louis; J. D. Peters, Secretary, Murphysboro, Ill.; J. P. Foster, Auditor, St. Louis; Edward Brown, General Freight and Passenger Agent, St. Louis; F. H. Batchner, Superintendent; J. W. Lewis, Master Mechanic, and James Anderson, Roadmaster, all at Murphysboro, Ill., and S. L. Sherer, Purchasing Agent, St. Louis.

Cincinnati, Hamilton & Dayton.—The following announcement was issued by President M. D. Woodford on Aug. 5: William M. Greene is this day appointed General Manager of the Cincinnati, Hamilton & Dayton Railroad and associated lines, with office at Cincinnati. He will have full charge of the traffic and operation of the system, and heads of departments will report to him and be subject to his orders.

Cincinnati, Jackson & Mackinaw.—The offices of Harry A. Kellar, General Freight and Ticket Accountant of the road, are being removed from Van Wert to Toledo. Some years ago the entire general offices of the road were in Van Wert, but they have been removed gradually to Toledo.

Grand Rapids & Indiana.—C. S. Cheney has been appointed Chief Train Dispatcher in place of W. J. Quinlan, resigned.

Great Falls & Canada.—The stockholders held their annual meeting at Great Falls, Mont., last week. The following board of directors was elected: Sir Alexander T. Galt, of Montreal; Peter Redpath, of London, Eng.; T. E. Collins, of Great Falls; E. T. Galt, of Lethbridge; W. D. Barclay, of Lethbridge; William A. Barr, of St. Paul. Sir Alexander Galt was elected President, T. E. Collins, Vice-President; W. A. Barr, Secretary and Treasurer; E. T. Galt General Manager; W. D. Barclay, Superintendent.

Louisville & Nashville.—J. B. Baylow has been appointed Chief Train Dispatcher of the Birmingham Mineral, vice F. Kestler, appointed Chief Train Dispatcher of the South & North Alabama Railroad between Birmingham & Montgomery. He succeeds G. W. Forlyce, assigned to other duties.

Missouri, Kansas & Texas.—W. G. Crush has been appointed General Passenger and Ticket Agent of the Missouri, Kansas & Texas, with office at Denison, Tex., to fill the vacancy caused by the resignation of H. P. Hughes. This appointment is dated Aug. 1, but has been heretofore announced.

Omaha & St. Louis.—F. M. Gault having resigned the position of General Manager, the office has been abolished. Until further notice such correspondence as has been sent to the General Manager heretofore should be sent to the Receiver, J. F. Barnard, at Council Bluffs, Ia.

Philadelphia, Reading & New England.—Mr. M. E. Ensign has been appointed Soliciting Freight Agent vice H. K. Lines, with office at Hartford, Conn.

Pittsburgh, Beltzhoover & Knoxville.—President, James M. Bailey, Allegheny. Directors: William H. Nimick, James N. McRoberts, Robert A. Carter and Alex M. Nepper, Pittsburgh.

Texas & Pacific.—The company has appointed F. R. Place Assistant Superintendent of Telegraph at Dallas, Tex., vice J. W. Stacey, deceased.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Baltimore & Drum Point.—A meeting of the directors of the reorganized company was held in Baltimore last week. A contract for completing the road to Drum Point has been made with J. H. McCreery, of Washington, D. C. The following are the new directors: Edward Lauterbach, of New York; Frank R. Biedler, Dr. H. Biedler, John P. Poe, Louis Adler and William N. Cohen, of Baltimore. It is said the unfinished part of the road from a point between Millersville and Odenton, in Anne Arundel County, to Drum Point, a distance of 61 miles, will be completed by Jan. 31, 1894. It is also stated that trains will be running over a por-

tion of the road within four months, and that connection will be made to Baltimore by either the Annapolis, Washington & Baltimore Railroad, at a point near Millersville, or by the Baltimore & Potomac, near denton. The reorganization of the road has been effected by Edward Lauterbach, of New York, who purchased it at the receiver's sale in February, 1892.

Burlington & Missouri River.—A newspaper published at Sheridan, Wyo., reports that the extension of the line from Sheridan is being actively pushed by the contractors. The work now under contract is about 20 miles long from Sheridan northwest to the Montana State line in the direction of Billings, Mont. Kilpatrick Bros. & Collins have a considerable force of sub-contractors on the present work, and it is thought that the grading will be continued beyond the Montana State line without any important delay. The track has been laid from Sheridan for about ten miles. Another report says that the sub-contractors are discharging their men, and that all construction work is being abandoned.

Butte, Anaconda & Pacific.—A considerable part of the rails for this road have now been delivered at Butte, Mont., and the tracklaying is not likely to be further delayed. The work has already begun near Butte. The distance to Anaconda is 25 miles, but there is also a large amount of sidings to build.

Chicago, St. Paul, Minneapolis & Omaha.—Tracklaying on the extension from Ponca to Newcastle, Neb., is now completed, but the line is not likely to be opened for business before Sept. 1. The surfacing of the track is far from completed.

Chicago & Texas.—This company has been organized to operate the Grand Tower & Carbondale and the Grand Tower & Cape Girardeau railroads in Illinois which are controlled by the St. Louis Ore & Steel Co., and the formal consolidation was effected last week. The new company will operate 57 miles of road from Carbondale to East Cape Girardeau, Ill. The northern half of this line, heretofore called the Grand Tower & Carbondale, has been in operation between Carbondale and Grand Tower, 31 miles, for some years. It was extended in 1887 under the name of the Grand Tower & Cape Girardeau along the east bank of the Mississippi River to Cape Girardeau, 26 miles. No changes are made in the organization of the company, E. K. Hitchcock, of St. Louis, continuing as President, and O. L. Garrison as Vice President.

Cleveland, Cincinnati, Chicago & St. Louis.—The building of a second track between Cincinnati and Springfield and Cincinnati and Indianapolis will begin this fall, it is announced. Whether the double tracking will be extended from Columbus to Cleveland will depend, it is said, on the condition of traffic this year and the financial conditions. Between these two cities the country is very level, and the cost of construction would be comparatively small. From Cleveland to Berea there is already a double track, and the roadbed is graded as far south as Grafton. All the bridges were built for two tracks, so that a large part of the extra cost of double tracking on the Columbus-Cleveland Division is eliminated. On the Chicago Division, between Cincinnati and Valley Junction (20 miles) double-track work has been finished.

Cleveland & Southwestern.—The company has had recorded in Alno a mortgage to secure an issue of \$1,300,000 of five per cent. bonds. This company has been organized by the principal stockholders of the Cleveland, Lorain & Wheeling Railroad, for the purpose of building a cut-off or short route into Cleveland from its own main line. The route was surveyed last spring, and it was then expected that construction would begin this summer. The financial stringency delayed matters somewhat until the Cleveland, Wooster & Muskingum Valley Railroad a few weeks ago obtained authority from the state to extend its road from Lodi to Cleveland. The routes are practically the same, and the company is endeavoring to get the right of way purchased and actual construction begun before any work is done on the other line.

Columbus Terminal & Transfer Co.—The new freighthouse and terminal facilities constructed by this company at Columbus, O., have been completed and turned over this week to the Columbus, Shawnee & Hocking and Sandusky & Columbus Short Line railroads, which have leased and will jointly use the properties, having withdrawn from the "Big Four" terminals.

Duluth, Mississippi River & Northern.—This road is to be extended to the western end of the Mesabi iron range in Minnesota. The present objective point is the Lake Superior mine in Township 57, Range 21. The road will be operated in connection with the Duluth & Winnipeg and will use the ore docks and terminals of the latter road on Alton Bay, Superior. W. A. Dafter, Swan River, Minn., is Chief Engineer.

Ebensburg & Black Lick.—All work has been suspended with the exception of finishing the cuts that have already been commenced. The road is a branch of the Pennsylvania, being built from Ebensburg, Pa., to coal-fields in Indiana County, and the first 10 miles has been about finished.

Elkhart & Western.—This railroad, extending from Mishawaka, Ind., to Elkhart, Ind., will be open for business Sept. 1, with the following stations: Mishawaka, Willow Creek, Pleasant Valley, Riverside and Elkhart. Connections are made at Mishawaka with the Chicago & Grand Trunk, at Elkhart with the C. C. C. and St. L. (Big Four Route) and the Lake Shore & Michigan Southern. From Elkhart a new line is opened up to Chicago and the West, and from Mishawaka to the South. The road is being extended to South Bend, Ind.

Fairmont, Morgantown & Pittsburgh.—The track on the new portion of the road is now laid for some miles north of Morgantown, W. Va. The road is now operated by the Baltimore & Ohio between F. M. & P. Junction and Morgantown, 24.7 miles, the extension being north of the latter town. The road extends from the main line of the Baltimore & Ohio one mile west of Fairmont, W. Va., and crosses the Monongahela River, following along its east bank to Morgantown, and thence to the state line of West Virginia and Pennsylvania; thence from the state line along the east bank of the Monongahela River to Point Marion, Pa., at which point the Cheat River is crossed to the west bank; thence along the west bank of the Cheat River to the mouth of Grassy Run; thence up the valley of Grassy Run via Morgan's Summit to Smithfield, on George's Creek; thence via Fairchance, Oliphant, Brownfield, Hutchinson, Redstone Junction, Lick Run

Junction, Leith, to Uniontown, being a total distance from F. M. & P. Junction of 56.7 miles. The line in Pennsylvania from the state line to Uniontown is known as the State Line Railroad. That portion of the F. M. & P. Railroad between F. M. & P. Junction and Morgantown, has been in operation for a number of years. That portion of the State Line Railroad between Uniontown and Smithfield, a distance of 10.2 miles, has been in operation since 1891. From the above it will be seen that a gap between Smithfield and Morgantown, a distance of 21.8 miles, existed. The graduation and masonry for this gap was begun in June and July, 1892, and has been vigorously pushed forward until now, when it is all practically finished, and the work of tracklaying is going on rapidly. In the last two months the track has been extended northward from Morgantown, a distance of five miles, to West Run, and from Smithfield southward, a distance of five miles, on Aug. 1 last, leaving yet to be laid 11.8 miles in order to join the two ends. The contract for the tracklaying, side tracks, water stations, station buildings and bridges and bridge superstructure was awarded to Drake & Stratton Co., Ltd., of Pittsburgh, and at present is being executed. Particulars of this work were published May 5, p. 347. The work is being done under the direction of W. T. Manning, Acting Chief Engineer of the Baltimore & Ohio.

Gulf, Beaumont & Kansas City.—The stockholders have authorized a mortgage for \$750,000 to secure an issue of six per cent. bonds at the rate of \$10,000 a mile on the road now building north of Beaumont, Tex.

Kanawha & Michigan.—The Gauley extension, 32 miles long, between Malden, near Charleston, W. Va., and the junction with the Chesapeake & Ohio road at the Gauley River, was opened this week. The stations on the line are Malden, Burning Springs, Platt, Witcher, Feal, Shrewsbury, Monarch, Cedar Grove, Riverside, Roe, Cannelton, Johnston, Carbon, Kanawha Falls, Gauley Bridge and C. & O. Junction.

Montreal & Western.—The Canadian Pacific has agreed to commence operating this road as far as St. Jovite, Que., on Sept. 1, the latter town being 52 miles north of St. Jerome, the southern terminus. The line is now operated as far as St. Agathe. Mr. C. W. Spencer, Superintendent of the Eastern Division of the Canadian Pacific, says that the new line opens up a magnificently wooded country, which will supply a large lumber traffic to the Canadian Pacific. Farther up the line, in a region where the rails are not yet laid, there is said to be some excellent agricultural land, and the line will be extended as soon as possible.

New Roads.—King & Co., of Hazleton, Pa., the contractors who commenced work on the new coal road of Coxe Bros. & Co., which will extend from Eckley, Pa., to Buck Mountain, are making good progress. The road will be completed at an early day.

Ottawa, Arnprior & Parry Sound.—The Chief Engineer states that the contract for the construction of the first 10 miles of the road beyond Eganville, Ont., has been awarded to Mr. Heald, who constructed the other portions of the line. Regular passenger trains will be run between Ottawa and Arnprior, Ont., by September, and between Ottawa and Eganville by November. One span of the iron bridge across the Madawaska River near Arnprior is completed, and the other one is ready to be put up.

Philadelphia & Frankford.—This road, the Frankford branch of the Philadelphia & Reading Railroad, on which work has been stopped for some time, will, it is believed, soon be pushed to completion. It will require \$200,000 to complete the road, build stations and do other necessary work. The failure of the Reading receivers to carry out the terms of the original contract has caused some embarrassment, but this will soon be overcome, as arrangements are about closed for securing the necessary funds, and the officers look forward to the early completion of the road. W. W. Foulkrod, of Philadelphia, is President.

Philadelphia & Reading.—The Philadelphia & Newtown Connecting Railroad, connecting the Newtown road at Olney with the Tabor branch of the Philadelphia & Reading near Logan, about a mile and a quarter in length, is about completed, and will be open for travel on or about Aug. 15. With the opening of this branch most of the trains will be run into the Market street station, Philadelphia.

Pittsburgh, Beltzhoover & Knoxville.—This corporation was chartered at Harrisburg, Aug. 8. Its capitalization is \$15,000. The line will extend from a point in Pittsburgh, through the town of Beltzhoover, to a point in Knoxville, a distance of 1½ miles. James M. Bailey, President, and Robert A. Carter, Director, each holds 140 shares.

Queens & Shelburne.—It is understood that the work of locating the line will be commenced at once. The preliminary survey of the line in Ontario last autumn will form the basis of the locating work now to be done. The maps and plans are being arranged for submission to the government.

Snow Fork & Hocking.—The route of this branch of the Baltimore & Ohio through the coalfields of Hocking and Athens counties, Ohio, has been finally determined upon. The route begins at the end of the Rock Run branch of the Straightville Division of the Baltimore & Ohio, two miles west of Shawnee, O., running through Murray, Orbiston, Buchtel, Doanville, and terminating for the present at Chancey, Athens County, O. The final southern terminus will be at Athens, O. The surveys are completed, and three-fourths of the right of way obtained. No time has yet been set for letting contracts of any kind. There are about four miles of rather difficult work, consisting of two tunnels, rock cutting and heavy earthwork. The rest of the work is of an average character. David Lee, of Zanesville, O., is President and W. A. Smith, Zanesville, Assistant Chief Engineer.

Texarkana & Fort Smith.—The directors have made a general contract with the Arkansas Construction Co., of Kansas City, for building the road south from Texarkana, Tex., to Sabine Pass and north from the present terminus to Fort Smith. This road is now controlled by the Kansas City, Pittsburgh & Gulf, and the Arkansas Construction Co. is apparently composed of directors and other stockholders of the Kansas City, Pittsburgh & Gulf.

Toledo & Ohio Central.—Opposition is developing among the people of Columbus, O., to the plan proposed by this road to enter that city over the levee, unless the company agrees to pay a large ground rental. The matter will probably be brought into the courts.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The comparative statement of operations for the month of June and the twelve months of the fiscal year, published below, includes the earnings of the Colorado Midland:

Month of June.	1893.	1892.	Inc. or dec.
Aver. operated mileage.....	7,481	7,180	I. 301
Gross earn.....	\$3,295,804	\$3,256,424	I. \$39,380
Oper. expen.....	2,241,399	2,277,622	D. 36,223
Net earn.....	\$1,053,905	\$978,802	I. \$75,103
Other receipts.....	75,000	75,000	
Total net earn.....	\$1,128,905	\$1,053,802	I. \$75,103
One-twelfth ann. fixed charges (est.).....	919,000	917,000	I. 2,000
Surplus.....	\$209,905	\$136,802	I. \$73,103
Twelve months, July 1, 1892, to June 30, 1893.			
Aver. operated mileage.....	7,481	7,175	I. 6
Gross earn.....	\$41,316,517	\$38,541,789	I. \$2,774,728
Oper. expen.....	28,605,799	26,750,951	I. 1,854,848
Net earn.....	\$12,710,718	\$11,790,838	I. \$919,880
Other receipts.....	\$900,000	\$900,000	
Total net earn.....	\$13,610,718	\$12,690,838	I. \$919,880
Twelve-twelfths annual fixed charges (est.).....	11,028,000	11,004,000	I. 24,000
Surplus.....	\$2,582,718	\$1,686,838	I. \$895,880

The report of the fiscal year of the general system, including the St. Louis & San Francisco, makes the following showing:

Twelve months, July 1, 1892, to June 30, 1893.	1893.	1892.	Inc.
Av. oper. mileage.....	9,345	9,339	6
Gross earn.....	\$50,733,706	\$47,347,226	\$3,386,480
Oper. expen.....	34,668,168	32,229,770	2,438,398
Net earn.....	\$16,065,538	\$15,117,456	948,082
Other receipts.....	900,000	900,000	
Total net earn.....	\$16,965,538	\$16,017,456	\$948,082
Twelve-twelfths annual fixed charges (est.).....	\$14,328,000	\$14,304,000	\$24,000
Surplus.....	\$2,637,538	\$1,713,456	\$924,082

Chesapeake, Ohio & Southwestern.—The lease of the Chesapeake, Ohio & Southwestern road to the Newport News & Mississippi Valley Company, under which the latter has, for the last seven years, operated the line between Memphis and Louisville, has been canceled. This step was made necessary by recent legislation in Kentucky, which prohibits foreign corporations from operating railroads in that State.

Chicago & Alton.—The company will issue \$2,500,000 stock to retire bonds amounting to \$2,929,000 next April. The company will save \$5,000 a year in interest. The new stock will be offered to present stockholders at 114.

Illinois Central.—The income from traffic for the twelve months ending June 30, 1893 and 1892, is reported as follows:

	1893.	1892.	Inc.
Miles operated.....	2,888	2,888	
Gross receipts from traffic.....	\$20,095,191	\$19,291,700	\$803,491
Operating expenses and taxes.....	14,283,934	14,070,020	213,914
Net earn.....	\$5,811,257	\$5,221,740	\$589,517

The gross receipts from traffic for the month of July, 1893, are estimated at \$1,733,249; the receipts for July, 1892, were \$1,449,568, the estimated increase being \$283,683.

Lehigh Valley.—The lease of the Lehigh Valley Railroad Company to the Philadelphia & Reading Railroad, which was effected on Feb. 11, 1892, was dissolved on Aug. 8, by the directors of the leased road, who asserted the right of withdrawing from the agreement upon any default of the Philadelphia & Reading in the payment of its obligations under that document. The action was taken because of the non-payment of \$968,768 for coal bought from the Lehigh Valley Coal Company. The directors in announcing the annulment of the lease, declare that they have repossessed themselves of the entire property devised under the lease, and that they recover it at the beginning of a period of the year which has always been for them one of unusual prosperity, and they express conviction that no interest will be deteriorated, but on the contrary improved, by their action. Officers of the company say that the company has a floating debt of less than \$4,000,000, and has \$14,000,000 Lehigh Coal Company and other available assets.

The abrogation of the lease will not affect the harmonious relations between the two companies and the interchange of traffic will be continued, as far as possible, as it has been in the past. The results of the cancelling of the lease, while far-reaching, will only appear gradually, as the separation of the interests and property of the two corporations is effected. The coal contracts between the railroad and the individual coal operators will now probably be terminated excepting those made before the lease to the Philadelphia & Reading was considered. By these contracts the individual operators turned over the coal they mined to the coal combination, and were paid a fixed percentage of the price received at tidewater. The arrangement was originally made to enable the Philadelphia & Reading to obtain greater control over the coal trade, but it has always proved burdensome to the company. The operators have made very large profits under these contracts and the railroad have suffered large losses. The operators received from the railroad 60 per cent. of the average price of coal at tidewater, whereas formerly they marketed their own coal and paid the railroad a fixed rate of transportation.

Louisville, St. Louis & Texas.—Attilla Cox has been appointed Receiver for the above railroad. It extends from Henderson to West Point, Ky., 121 miles, and from the latter point has an entrance into Louisville over the Chesapeake, Ohio & Southwestern tracks. It has several short branches, making a total of 166 miles. An extension of 15 miles is under construction in order to connect with the Louisville & Nashville, with which a close traffic contract is proposed. The capital stock is \$3,071,100, and a consolidated mortgage for \$5,000,000 was authorized last year, \$2,800,000 of this being for the purpose of retiring the old first mortgage.

Minneapolis & St. Louis.—The report of the Receiver for the fiscal year ending June 30 will be issued soon. The figures have been published and show gross earnings for the year of \$1,961,850; operating expenses, including taxes, were \$1,255,250; net earnings, \$706,600; other income, \$126,000; total income, \$832,600; deducting fixed charges, including interest on second incomes, \$591,000; surplus, \$241,600. During the last year more than \$1,000,000, equivalent to about two years' total fixed charges, was paid by order of the court. In addition, about \$200,000 was expended in improving and bettering the property. Nearly \$100,000 has been paid out for allowances to counsel in the foreclosure proceedings. There is now on hand about \$400,000 in cash, besides a large supply of railroad material worth over \$150,000. It is expected that as soon as the bond market improves the Reorganization Committee will issue its plan, involving an issue of bonds in order to pay off the equipment bonds and back interest and take the road from the Receiver's hands.

New York Central & Hudson River.—The gross earnings for July, 1893, are reported as \$3,926,231, the comparison being with gross earnings of \$3,793,039 in 1892, an increase of \$133,192.

Pennsylvania.—The company has effected a loan in London for \$3,000,000 at six per cent. interest, to complete improvements under way. The loan is for six months. Consolidated mortgage four per cent. bonds, a portion of which were recently sold at 102½, were given as security. It is understood that the bankers who loaned the money have an option to take the bonds at 101.

Sandersville & Tonnelle.—This road has been leased by the Augusta & Southern. The rental is said to be seven per cent. on \$25,000. The road is only three miles long, but it gives the Augusta Southern a connection with the Central of Georgia at Tonnelle, Ga.

Texas Western.—Attorney-General Culberson, of Texas, has instituted *quo warranto* proceedings in the District Court at Hempstead, Waller County, to forfeit the charter of this line, a narrow gauge road from Houston west to Sealey, 40 miles, in Austin County, Tex. Receiver Packard says that there is no good reason why such a suit should be filed. The road is in as good condition as it has been for the past 10 years. The road has been operated at a loss for a number of years. The Missouri, Kansas & Texas in building its new line into Houston practically paralleled the road from the Brazos River to Houston.

Toledo, St. Louis & Kansas City.—The committee representing the first mortgage bondholders of the railroad has appointed the following committee on reorganization: John E. Havemeyer, H. O. Armour, James M. Hartshorne, Otto T. Bannard, and M. S. Paton. Copies of the agreement and plan of reorganization prepared by this committee have been printed and distributed.

Union Pacific.—An important meeting of the directors was held in New York City on Aug. 8, the principal business before the meeting being in relation to the sinking fund eight per cent. bonds, amounting to more than \$5,000,000, which mature on Sept. 1. A plan has been agreed upon which gives to the present holders of the sinking fund bonds the opportunity to renew under present conditions and rate of interest for six years, the company reserving the right to draw the bonds at par after the first year or to redeem the whole amount of the bonds after Sept. 1, 1894.

The following statement was presented, showing the status of the bonds:

Union Pacific sinking fund bonds outstanding Jan. 1, 1893:	
Coupon bonds.....	\$4,721,000
Registered bonds.....	455,000
Total.....	\$5,176,000

Balance in hands of Union Trust Co., Trustee, Jan. 1, 1893, representing uninvested sinking fund contributions.....	254,501
Balance in hands of Union Trust Co., Trustee, Jan. 1, 1893, representing proceeds derived from lands sold, amount on deposit, payments, etc.....	650,163
Estimated amount of cash to be received from land sales, etc., eight months to Sept. 1, 1893.....	500,000
Total.....	\$1,404,665

Balance of debt to be provided for.....	3,711,334
Land or notes outstanding Jan. 1, 1893.....	3,697,890
Less estimated payments, January to August.....	327,988
Balance.....	\$3,069,302

Add estimated value of unsold land, Jan. 1, 1893.....	3,079,000
Total.....	\$6,148,302

The amount \$6,148,302, less the amount \$3,711,335, shows the surplus of security in excess of the amount of indebtedness to be provided for, namely, \$2,436,967.

TRAFFIC.

Traffic Notes.

The Atchison, Topeka & Santa Fe has offered to carry seed wheat to Western Kansas free, from any point within the state.

The Canadian Pacific and the Grand Trunk have issued a joint circular notifying consignees that after Sept. 1 freight bills must be paid on delivery.

The ticket brokers of Denver are beginning to feel the severity of the recent law passed to exterminate them, and some of the men have gone out of business.

The half-fare excursions from the Atlantic seaboard to the World's Fair continue to be well patronized, and it has been decided to continue them until Sept. 18.

During the month of July, 1,366 freight trains, with 72,989 loaded and 1,435 empty cars, passed eastward, through the Pennsylvania's yards at Harrisburg, Pa. In the same month, 1,129 trains, with 12,538 loaded and 47,851 empty cars, passed through on their way west. This is a falling off from the June movement.

It is said that the Great Northern and the Canadian Pacific have restored a part of the traffic arrangements which were discontinued on the completion of the Great Northern line to the Pacific coast. The latter road has evidently concluded to get what it can out of the Canadian Pacific traffic before the completion of the Canadian line from Minneapolis northwestward to connect with the main line.

Chicago Traffic Matters.

Passenger rates both east and west of here are apparently being maintained. From points south of the Ohio River, however, there is considerable demoralization, owing to the action of the Southern lines. The Mobile & Ohio last week quoted a round trip rate of \$12 from Mobile to Chicago, a reduction from regular rates of about 50 per cent. The Jacksonville Southeastern made a cut rate of \$3 from Jacksonville to Chicago last week, for 10 days, ending tomorrow, on the ground that the Wabash and Alton

were making secret concessions which reduced the agreed rate to that figure.

The managers of the Central Traffic Association meet to-morrow for the further consideration of World's Fair rates. It will be remembered that the rates agreed upon at the last meeting were to a certain extent experimental, and the result of the advances then agreed upon from Ohio River territory will be submitted to the meeting to-morrow. Other important subjects to come before the meeting are export rates and division of east-bound freight tonnage. Both of these subjects are likely to receive considerable discussion before any agreement is reached.

The Atchison, Topeka & Santa Fe has terminated its traffic contract with the Jacksonville Southeastern. No statement of the reason for doing so has been made, but it is reported to be largely on account of the non-payment of balances. The latter line announces that it will soon have another connection into Chicago. The next most available route would be the Rock Island. The passenger department of the Santa Fe will perhaps experience a relief by the termination of the contract, as it has been charged with most of the sins of all the roads in the Southwest ever since the contract has been in force, and it is doubtful whether there has been a meeting of the Association for a year or more at which some charge against or in connection with this through line has not been made.

Considerable dissatisfaction is expressed over the action of the Western lines in refusing to make rates for the Grand Army of the Republic via Chicago, and the Santa Fe has asked the members of the Western Passenger Association to reconsider the matter. It is the old fight between St. Louis and Chicago. St. Louis lines know that with the attractions of the Fair here they will lose all this business if rates are made the same, and this they do not propose to do. In this I think they are making a mistake. It would be better in the long run if they would accept the present situation and let the business take the unusual channel for this year.

An excursion to the great wheatfields of the Northwest, for the entertainment of Foreign Commissioners to the World's Fair and others interested in agriculture, has been arranged by the Chicago, Milwaukee & St. Paul and the Chicago & Northwestern railroads. The party will probably leave Chicago Aug. 21. It will be entertained at St. Paul and Minneapolis and stay over one Sunday at Lake Minnetonka. The excursionists will go to Grand Forks, Devil's Lake, and Larimore, where they will have an opportunity of seeing 10,000 acres of wheat cut.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines, for the week ending Aug. 5 amounted to 49,898 tons, against 49,881 tons during the preceding week, an increase of 17 tons, and against 52,743 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	Wk to Aug. 5	Wk to July 29
	Tons. P. c.	Tons. P. c.
Michigan Central.....	5,324 10.7	6,221 12.5
Wabash.....	4,867 9.7	5,030 10.1
Lake Shore & Michigan South.....	8,580 17.2	10,501 21.1
Pitts., Ft. Wayne & Chicago.....	6,371 12.8	6,253 12.5
Pitts., Cin., Chicago & St. Louis.....	5,513 11.1	5,550 11.0
Baltimore & Ohio.....	2,736 5.5	2,761 5.6
Chicago & Grand Trunk.....	3,082 6.2	2,940 5.9
New York, Chic. & St. Louis.....	4,211 8.4	4,249 8.5
Chicago & Erie.....	7,190 14.4	6,281 12.6
C. C. & St. Louis.....	2,024 4.0	2,095 4.2
Totals.....	49,898 100.0	49,881 100.0

Of the above shipments 1,868 tons were flour, 15,751 tons grain and millstuffs, 11,200 tons cured meats, 10,982 tons dressed beef, 1,974 tons butter, 1,876 tons hides and 3,743 tons lumber. The three Vanderbilt lines carried 36.3 per cent., the two Pennsylvania lines 23.9 per cent. The Lake lines carried 84,262 tons, against 90,169 tons during the preceding week, a decrease of 5,907 tons.

(Other Chicago traffic news will be found on page 608.)

Heavy Shipments of Grain at Montreal.

In consequence of the low price of grain, enormous quantities are arriving at Montreal for export, principally from American ports. The forwarding companies are taxed to their utmost capacity. The most sanguine among the grain shippers never expected that such a large volume of grain would, during the first few months of the season's navigation, be shipped from Montreal. The following figures show the shipments of grain from the opening of navigation to the end of July for four years: 1890, 5,357,668 bushels; 1891, 4,251,633 bushels; 1892, 9,338,470 bushels; 1893, 12,047,001 bushels. The present ocean freights to England are about three shillings for 480 lbs.

Wheat Traffic at Puget Sound.

The building of railroads to Puget Sound has induced a new drift of wheat traffic in the Pacific Northwest. Formerly all the wheat of the interior grainfields of Washington and Oregon was carried down the Columbia River to Portland. In 1881 a ship from England brought merchandise to Puget Sound and wanted a return cargo. The captain asked Portland for wheat, offering to take it for 2½ cents a bushel less than from Portland, as by loading on Puget Sound he would save a long voyage around to the Columbia's mouth, and towage up and down the river. The railroad from Portland to Puget Sound made a sufficiently low rate, and the first cargo of wheat sailed from Puget Sound to England. Now it is an established trade. Sixty vessels, carrying nearly 5,000,000 bushels, have cleared within a year, while Portland shipments amounted to only 6,000,000. The wheat trade has developed largely since 1888.

As it costs no more to ship by rail from the interior to Puget Sound, exporters attract wheat to Seattle by paying 2 cents more a bushel than the price at Portland. The moderate rate of 17½ cents by rail to tidewater, and 15 cents by water to Europe, is almost identical with the rail and water rates which the Dakota and Minnesota farmers pay in shipping via Duluth and Buffalo to Europe. This places the wheat raisers of this region in almost as favorable a position as those nearly 2,000 miles eastward, and accounts for the rapid expansion of wheatfields of Eastern Washington and Oregon. Of the wheat lands on the great plain of the Columbia River, 3,000,000 acres, less than 10 per cent. is under cultivation. The quality of all this wheat is not quite equal to that of Minnesota and Dakota, being soft instead of hard, but it brings the same price for export, while the average yield to the acre is 25 bushels, as compared with 15 to 20 bushels in the more eastern States. Nearly every trans-Pacific steamer starting from the Sound carries some wheat, but the major part goes to Europe.—Cor. New York Tribune.